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# PROVOCATIONAL EDUCATION IN THE PUBLIC SCHOOLS

CLAYTON AND BROWN



LELAND STANFORD JUNIOR UNIVERSITY







# PREVOCATIONAL EDUCATION IN THE PUBLIC SCHOOLS

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## PREFACE

**DURING** the past five years considerable interest has been developed in the problem of securing a better adjustment of our educational methods and ideals to the needs of those who, though they form the vast majority of our children, are, for one reason or another, deriving the least benefit from the present school system, and are leaving its care altogether before reaching the age of sixteen or seventeen years.

Such school systems as have done experimental work looking to the solution of this problem are constantly receiving requests for information relating to the purpose of the work, the methods which are being employed, and the results realized or expected.

It is believed that school administrators and school-teachers in general will find something of interest and value in the information presented in this volume regarding one important branch of this experimental work, namely prevocational education.

For the purpose of collecting and of organizing such information the University of Chicago has conducted, during the past three years, an experimental industrial class. Instruction both in shopwork and in the book subjects has been given very largely by graduate students in the Department of Education, mature men and women sincerely interested in the larger aspects of the problem presented.

The Albert G. Lane Technical High School of Chicago includes among its many departments one of special

interest, consisting of so-called prevocational classes and providing for over-aged boys from grades six, seven, and eight of the elementary schools.

The authors of this book, having access as they do to the resources of these two institutions, have been enabled to collect and to organize the material presented herewith. They have also studied the prevocational work in other cities by personal inspection of the schools and by examination of their courses of study. It is believed that the facts presented will be valuable not only to instructors of prevocational classes, but as well to teachers in those elementary schools where no special provisions are made for the pupils who are failing in the usual school work, or who are apparently hopelessly behind grade or are certainly out of harmony with the aims and methods of so-called "general education." Since prevocational work is almost invariably given for the benefit of such children, doubtless many teachers in the elementary schools will be glad to learn of some of the concrete material which the special schools are utilizing in teaching the regular school subjects; as, for example, reading, history, civics, hygiene, elementary science, arithmetic, shopwork, and drawing.

It is the purpose of this book to present in detail some of the school subjects, setting forth the methods which have been found to be measurably successful, the objects which have been paramount in presenting the subjects, some of the concrete material which has been used, and references to sources of other similar material.

This presentation of concrete material will be preceded by a discussion of the need of prevocational work

## PREFACE



as an essential part of the American public school system, and of the present development of the movement.

The discussion deals largely with the work which has been developed for boys. It is believed, however, that the principles apply also in the field of girls' work, and it is hoped that this somewhat neglected side may receive some stimulus from this presentation.

Grateful acknowledgment is made of valuable assistance received from various sources. Members of the Graduate Department of the University of Chicago have coöperated in collecting suitable material for courses of study and in presenting such material experimentally to the industrial classes. Prominent among these graduate students are Miss Miriam Besley, Miss L. Grace Huff, Mr. L. A. P. Harms and Mr. L. V. Koos.

Thanks are due the following school officials for preparing, especially for this volume, detailed information regarding the prevocational work in their several cities: Mr. John C. Brodhead, Associate Director of Manual Arts, Boston, Massachusetts; Mr. Ben W. Johnson, Director of Industrial Education, Seattle, Washington; Mr. J. C. Wright, Director of Vocational and Manual Training Instruction, Kansas City, Missouri; Miss Ethel M. Lovell, Prevocational School, Louisville, Kentucky (now Principal of the Sewing Trades School, Cincinnati, Ohio); and Mr. Charles F. Perry, Supervisor of Industrial Education, Milwaukee, Wisconsin.

Especial acknowledgment is made of the generous spirit of coöperation shown by the Principal of the Albert G. Lane Technical High School, Chicago, Mr. William J. Bogan, whose sympathy and courage have made possible the remarkable exemplification of prevocational work to be found in that institution.



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# PREVOCATIONAL EDUCATION IN THE PUBLIC SCHOOLS

## CHAPTER I

### THE NATURE AND PURPOSE OF PREVOCATIONAL EDUCATION

THE genuine public and professional interest in vocational education, which has developed such proportions during the past decade, has resulted in many modifications of, and additions to, public-school functions and practices. Perhaps none of these is more far-reaching in its import than the development of prevocational work and all that it represents in our public-school systems.

Several cities have developed prevocational work, and, while such work varies in organization and content, a common purpose and similar methods are found in all these examples. The term "prevocational" has been employed in this book in the commonly accepted meaning which these cities give it, but it is desirable, at the outset, to discuss in a general way the meaning of this term; the purpose of establishing such work; and the more important characteristics of the pupils to whom the work is given.

That the term "prevocational" needs some explanation is evidenced by the fact that it is used in so many different ways. In common with the names affixed to many other plans of action, the term does not fully and accurately describe the procedure which it serves to

denominate. It is impossible to find a name which will accurately describe or define the characteristics of the school work which is now being done under the term in question, but the characteristics themselves will be revealed throughout this volume. It is desirable in this connection, however, to trace the evolution of the word during the five or six years of its existence, in order to determine what the term really denotes.

A clear understanding of the term may be gained by reflecting on the nature of a pre-legal or a pre-medical course as offered in a university. Such courses are intended to be as cultural as any other college work, but they are intended to give the *kind* of cultural training which will furnish the best foundation for the subsequent legal or medical course. Such courses are made up of regular college subjects so grouped that they will fulfill all academic requirements for a degree. It is not contemplated that any important subdivision of human knowledge included in the degree course — as, for example, history — shall be omitted entirely, but it is suggested that certain subjects be emphasized more than others, and especially that intelligent selection of material be made from the many possibilities afforded by the different required subjects. Here is recognition of the fact that of two subjects which are equally cultural, one may have more practical value than the other for certain individuals.

In the same way prevocational work is intended to be as cultural and as inspirational as any of the regular school work for the children to whom it is given, but it is more valuable than the regular work as a preparation for the subsequent occupational experiences of these children, most of whom enter "vocations" at an early

age, and it is a better and more attractive preparation for the vocational courses higher up than is the regular course for which it is substituted.

It is necessary, at this point, to note the modern educational significance of the term "vocational education." While it is evident that professional education is "vocational education," the word "vocational," as it is commonly used, refers to the education which prepares somewhat specifically for the humbler occupations, those which require a preparation of *less* than college grade, and which, therefore, are not reached by way of the university. The first occupations for which this humbler or non-professional vocational training was given were industrial in their nature. For this reason "industrial education" was the term first used to designate all kinds of practical education for those who could not have or did not want a professional training, but who, nevertheless, needed a purposeful preparation for the work which they would be called upon to do. The term "vocational education" came into prominence only after the term "industrial education" was seen to be too narrow to cover all the school activities conducted under that name.

Thus "vocational education" refers to educational programs which contemplate school training of less than college grade, and which relate to the humbler vocations or occupations. Such training is, furthermore, intended for pupils fourteen years of age or over.

With this conception of the meaning of the term "vocational," it becomes clear that "prevocational" simply means the type of general education which will lay a better foundation for vocational courses than is commonly laid by the regular school work.

It is sometimes urged that the term "prevocational" is misleading and likely to deceive the public, since it carries the suggestion of specific preparation for a vocation when, in reality, it does not necessarily give such preparation. To this objection it should be said that the training given is preparatory for vocational education rather than for a vocation itself. It cannot be denied successfully that the traditional work of the elementary school is preparatory for a higher school which, in its turn, is preparatory for a still higher education. To the prevocational type of child, the practical application of it all seems to be postponed indefinitely. The prevocational course, therefore, seeks to prepare for final vocational courses which reveal clearly their immediate articulation with the work of the world. Consequently the prevocational course gives, in a very genuine sense, quite as definite a preparation for vocational life as its name would seem to imply.

While the term has sometimes been loosely used and has been made to apply to widely different courses of study, there can be no doubt that in recent years it has come to have a commonly accepted place in educational nomenclature. The work which is done under this name in a number of the large cities makes it evident that a prevocational course is an attempt to modify the work commonly found in grades seven and eight, or possibly six, seven, and eight, in order to motivate that work for those pupils who have been seriously retarded and are hopelessly behind grade because they need the stimulation which comes from concrete doing, or because of pronounced irregularity in attendance resulting from peculiar home conditions or from illness. While these pupils vary in their characteristics, they

are alike in this, that they are predisposed to leave school at an early age. Again, while they are thus disposed for a variety of reasons, one reason is practically common to all, namely, a distaste for school work as they know it, and a consequent inclination to substitute vocational for educational life. Prevocational work, therefore, has come to have a clearly defined purpose, namely, to secure an adjustment of the "system" to these vocationally minded pupils. They need the fundamental book subjects as much as the others, and if the "bookish" way of teaching does not make its appeal strongly to them, the problem is to vitalize such work by devising other methods and by accepting different, though not necessarily lower, standards of attainment than those by which school work is usually measured.

The prevocational course, therefore, may appear to be only a modified form of general education, and it may be asked why it should not be so designated and be recommended for adoption for all elementary school pupils. The reply is that it is not necessary to make such substitution for work which has been conducted so successfully with thousands upon thousands of children. It is neither desirable nor necessary to relinquish traditional practices which are contributing so surely to the progress of many school children, but it is quite another matter to urge the adoption of different courses and new methods for that considerable group of children who do *not* succeed with the traditional work. The prevocational experiments, however, have important lessons for the traditional schools, and, since retarded children are to be found in nearly all elementary schools, grade teachers everywhere will be benefited greatly by studying the methods of prevocational education.

Whether these retarded children of thirteen to fifteen years of age are in the grades or in special prevocational classes, it is not so important that they learn certain prescribed facts as it is that they gain a desire to learn something. What that something is does not matter so much in the beginning as that more attention be given to developing pronounced individual differences. It is not necessary that all become interested in the same studies, but it is fundamentally important that each becomes intellectually active, — vitally and dynamically interested in some school work, — so much interested that the whole scheme of education takes on a new meaning and becomes a genuine pleasure.

In a certain prevocational class the boys attended school during the whole summer, seven and one half hours daily. Some of the parents expressed a doubt as to whether the work could be really valuable, because the boys liked it so much. It must be confessed that many teachers hold the opinion that school work should be filled with hard, unpleasant drudgery if it is to be truly educational, a belief which is evidently shared by children of the prevocational type and one which has led most of them to decide that school is to be avoided and attendance to be discontinued as early as possible. It would be interesting to speculate upon the effect of this belief upon American education.

It is amusing — or it would be if it were not so serious — how many teachers to-day believe that the greatest intellectual benefit comes to the pupil from the work which he finds most disagreeable, but which, nevertheless, he prosecutes with great diligence and from a sense of duty. Much of the high-school Latin and mathematics has been justified for most pupils and held to

be all but indispensable to their education, on the ground that, because of its difficulty, it exacts a type and intensity of intellectual effort sure to be of great benefit in developing the mental powers of the pupils wholly regardless of its practical or utilitarian value. That much of the work could not reveal its true worth and beauty until many years of diligent study had been given to it was considered to enhance the educational value of the effort expended upon it.

Because boys of the prevocational type are predisposed to seek early employment, such pedagogical motives for "getting an education" are discarded, and an attempt is made to utilize the incentives common to the workaday world. There is no reliance on the preposterous proposition that an education will enable one to earn his living without laborious work, but rather there is an attempt to show the necessity for hard work and especially the rewards and the satisfactions which it brings.

Most of the world's knowledge has been acquired through the unrelenting, painstaking efforts of patient, energetic, steadfast souls, working toward some goal, which, for one reason or another, assumed an interest greater than all else to that particular individual. Mere toil has done much for the world, especially when carried on under wise leadership, but toil inspired by an ideal, until toil itself becomes a joy, has worked the world's wonders and brought its blessings.

Educational literature reveals many attempts to improve pedagogical methods through the appeal to direct, immediate interest in work as well as in study, yet even down to our own times the rod has generally been the emblem of the schoolmaster and compulsion

has been his method. Rousseau, Pestalozzi, and Froebel have all preached the doctrine of joy in educational effort of all kinds, but our methods of study and recitation, of rewards and punishments, of the selection of the "fit" and the elimination of the "slow" and "stupid," have remained strangely stationary amid the change of subject-matter, schoolroom surroundings, and student body. There seems to have been little credence given to the opinion that "the world is to be saved by the laughter of the school children."

Within the past ten years, however, there has come a considerable change in this matter so far as it relates to the pupils whom we are considering in this volume — the prevocational type.

These children, usually found stranded or progressing but slowly in the upper elementary grades, have been unwilling or unable to apply themselves, and have resisted the attempts of others to drive them to the lifeless task of reading and memorizing a mass of literary material which some one else assures them will do them great ultimate good, but which, so far as they can see, is unrelated to anything in their own lives past, present, or to come. They have finally rebelled, or have acquired a refractory exterior which effectually protects them against the persuasions of their long-suffering teachers.

Now, these children, for their own benefit and for the sake of society, must be "educated." How shall it be accomplished? If being "educated" means "successfully completing a required course of study" and in a given way and at a given time, the task is well-nigh hopeless and may as well be abandoned, as long experience has evidenced. But if it can be conceded

that education may come from action and from thinking about that action with the view of determining subsequent procedure, and if it be acknowledged that such thinking may be rationalized by what others have done and thought before, then we have the basis for a new educational program.

Prevocational children are permitted to do things peculiarly adapted to their individual fitness, and to think, talk, write, and figure about the things which they have done. Action may be widely varied; thinking about a certain action may impel to more of the same thing or to a great range of similar or related activity, and both may be radically affected by reading about what mankind has done along this line and related lines. It is in this relation that the study of books becomes effective for prevocational children. It is useless to try to educate these or any other children without liberal use of books. In fact, the most important part of the prevocational course is what is usually referred to as "the related academic work," and the most important part of the program consists in motivating this book work by correlating it with some concrete, constructive work with a vocational content which the children genuinely enjoy and at which they will work vigorously.

Most of that which has been written about "joy in work" has referred to some kind of laborious, manual work. It should be remembered that, for many individuals, intellectual work is laborious and that it is quite necessary to find some way of making it joyous, — in other words, of "motivating education." Indeed the worker in every field of human endeavor, even the highest, needs the stimulus which comes from joy in

anticipated achievement that he may despise and endure the stress and strain "for the joy that is set before him." The new educational program provides for the bringing together in actual realization the necessity for hard work and the joy in its accomplishment.

This is a program which has proved highly effective in stimulating the children in prevocational classes, for while it can be said truly that such pupils are "concrete-minded," "seriously retarded," or "anti-book," they have two characteristics even more pronounced than these. First, they are physically active, and secondly, they are strongly individualistic and can never be grouped successfully under any narrowly limiting classifications. Above all they must not be considered "stupid" because they are behind their fellows in grade, and only rarely have they been found to be "subnormal." May it not be, after all, that our school system appeals in the main to one rather commonplace type of mind, albeit a type which is wholly praiseworthy and of immense value to society in that it can be counted upon to react in a particular way to any given set of conditions or experiences, and that the boys of whom we are speaking, being active and strongly individualistic, are nevertheless quite as normal, even more interesting and possibly of even greater potential value to society at large if their energies are directed into the proper channels? It is our purpose in a later chapter to set forth as vividly as may be the charming, lovable, human characteristics of prevocational boys in such a way as to show that no reasonable effort on the part of society to save them for years of subsequent training and education is too great in the light of their potential worth.

From the foregoing it will be seen that the establishment of prevocational work is essentially one of the features of the great social movement toward universal education. Perhaps the final outcome of this movement may result in the opening of our palatial high schools throughout the country, not only to the small minority who are now receiving the benefits of the many opportunities there afforded, but to the vast majority of boys and girls of high-school age, many of whom are hopelessly stranded in the grades. It may be that we shall come to see that what we have considered our high standards, as regards admission to the people's high schools, are really evidences of the relentlessness with which we have excluded from the beneficent influences of these institutions the very children who need them most. When our high schools shall become thoroughly democratized, and when "secondary education" shall mean education appropriate for any and all normal children between twelve and eighteen years of age, it may well be that prevocational work will pass off the stage and that the term will no longer have any significance. For the present, however, "prevocational" must stand for the symbol of liberality in providing, either in our upper elementary grades or in our high schools, appropriate types of educational activities for all children and for a promise that such work will be administered in the spirit of justice and impartial sympathy. Such a procedure will be of untold benefit to the future industrial workers of the country and to the industries which their labor makes possible, and when we shall have ceased to prate of the dignity of labor, and shall have made provisions for dignifying the workers by giving them an honored place in a truly demo-

cratic school system, we shall have done much more than advance the industrial interests of the United States. We shall have helped to make our schools, what they can never be under the conditions which obtain very largely to-day, dynamic agencies for social betterment.

## CHAPTER II

### PREVOCATIONAL EDUCATION A NATURAL DEVELOPMENT OF THE SCHOOL SYSTEM

IN view of the fact that the vocational education movement is but a phase of the progress of the nation toward universal education, it is important to consider certain recurrent questions relating to education in general, questions which never have been, perhaps never can be, permanently answered. Due consideration of these questions is indispensable to a comprehension of the real significance of the development of vocational and prevocational work in the history of American education.

The more important and pertinent of these recurrent questions are: To whom shall education be given? Who shall give the education? Why shall it be given? Of what shall it consist?

One who thinks deeply regarding these questions will be convinced that the subject is a complicated one. Little by little it will appear that there are two conflicting points of view. The first is that the individual is to be educated for his own benefit; the second, that he is to be educated for the benefit of society.

Comenius was perhaps the first of modern educators to state, as he did, about 1630, the principle of parental responsibility for the education of the child. It would seem natural that education resulting from such responsibility would have in mind chiefly the well-being

of the individual. It might, and under some conditions actually does, so equip the individual that he can get more than his share of the good things of life.

But another principle has been advanced, namely, the responsibility of the State. The State is held somewhat responsible both for furnishing the education and for requiring the individual to submit himself to the process of being educated.

Another fact must be noted at this point. There is to-day, and always has been, a difference of opinion as to just what experiences, educational and occupational, for youths between twelve and eighteen, will be to the best ultimate advantage of the individual. It happens, therefore, that the position and progress of the youth between twelve and eighteen are the resultant of two forces, one tending to hold him in school, the other tending to draw him into occupational life.

Each of these forces is complex and deserves at least a brief analysis.

Among the most important influences tending to hold the individual in school until his eighteenth or twentieth year may be mentioned the following: —

Tradition in this country confers a certain distinction on those people who have had extended connection with educational institutions. The professional man, or even the college graduate just because he is a college graduate, is looked upon as in a sense superior to, or distinguished from, all others.

Then there are various and genuine personal advantages which come with traditional education. These advantages are comprehensible to, and highly prized by, the true educator. In proportion as he is impressed with the value of personal culture and literary learning,

he sincerely desires it for all those who come under his care, and he conscientiously and persistently influences all his pupils to secure this prolonged period of schooling.

Another factor which must be reckoned with is that the school affords an asylum for those youths who are disinclined to take up the real burdens of the work of the world, and also for those parents who, being too busy to decide for themselves the best means of educating their children, hand them over to the care of some educational institution as the easiest way, whether that institution is equipped to develop the particular individual or not.

In opposition to these influences are to be noted certain others which tend to draw children or youths away from school. There is a constant demand on the part of industry for the labor of children and young people. Part of this demand comes from the desire to secure labor at a cost which is less than its real value, and part of it arises because certain industrial processes can be learned more readily by children than by adults.

Then there is a genuine need that some children contribute to their own support as early in life as possible. Under the present economic system it is not probable that all children can be maintained in idleness until eighteen years of age without charity or a considerable extension of socialistic ideals.

Again there are types of young people who respond much more quickly to the educational opportunities of real work than to the stimuli of school conditions and requirements. While there are educators who extol the training which comes through work, and while many attempts have been made to secure these advantages

for the school curriculum, the general lack of concrete work in the schools drives many youths early into occupations.

As noted above, we have here two groups of forces which are determining the amount of school training which each individual receives.

Society is coming to see that there are certain dangers which will arise, if the second group of influences becomes too strong. It is futile to continue to turn a stream of child workers into occupations which are paying adults less than a living wage, thus necessitating the consignment of their children to industry at the earliest possible age.

Even some of our far-sighted employers believe that the future of industry stands in doubt if we are continually to recruit its ranks only from those consigned to it by poverty, inexperience, and lack of personal initiative. Instead society must see to it that at least a saving minority shall enter industry because they choose to do so, and then enter it only when properly equipped to cope with the difficulties presented by our complex industrial system, difficulties technical, social, and personal.

The phenomenon which we call the demand for industrial education is a sincere attempt to hold true the balance between the two groups of forces described above, and this result will be obtained most effectively where industrial training is given in close proximity to other types of school work.

Let us make no mistake. No education has ever been given which has not contained elements of both general and specific training, of both liberal and vocational education. Even the most specialized form of indus-

trial training has invariably carried with it some general, intellectual development. Work given as "industrial education" which leaves the worker with the same mental equipment he possessed at the beginning cannot be classified as "education" at all. In other words, industrial education has always given a considerable degree of general training. Its tendency, therefore, is to ally itself with the group of influences which holds the youth in school. To the question, "Shall this youth be educated?" the promoter of industrial education answers, "Yes."

What is industrial training and how has it grown to its present status as a factor in education? By what means may it be still further developed? Is a natural growth or a forced growth more likely to produce a type of training which is consistent with our democratic institutions and directly beneficial to those for whom the work is being projected? These are questions which demand the most careful study.

What is industrial training? As a basis for discussion let it be defined simply as "education for the industrial worker." Enlarging somewhat upon this definition we should say that the education must be appropriate for the industrial worker; complete as far as it is carried, — that is, it must include all features, technical, general, inspirational, recreational; and that it must be dynamic, impelling the learner to desire more and more.

For centuries it was not thought necessary to "educate" industrial workers, or at least certain grades of industrial workers, except in so far as they were trained by and for their daily occupations. Even in New England, in earliest colonial days, the required schooling had no reference to the learner's economic status, but

merely was intended to enable him to read the Bible and understand the common law of the land.

It was not until it became a matter of general knowledge and of social concern that the industrial workers were *not* being educated, in any sense of the word, that the demand arose for "industrial education."

It was natural, therefore, that the initial steps toward industrial education should have been taken in a community where the industrial workers formed a large and important part of the population. Industrial development and density of population are generally co-existent. In fact, density of population may well be taken as evidence of industrial development and of the presence of masses of industrial workers.

Relatively few people who have drawn lessons in industrial education from the experiences of the State of Massachusetts have realized that the State is one of the most densely populated regions in the world. Barring Rhode Island, which is practically all urban, Massachusetts is the most densely populated State in the nation. Compared with Indiana, one of the States which has based its industrial education laws on those of Massachusetts, we find 419 inhabitants to the square mile in Massachusetts as against 75 in Indiana. These figures are taken from the federal census of 1910, but the industrialism of the State is of long standing and has had much to do with the development of educational methods and ideals in that commonwealth.

In fact, in the light of our simple definition, we might say that the first "industrial education" law was passed in 1852 when Massachusetts put upon her statute books the first compulsory school attendance laws in the United States.

Why may this be called an "industrial education" law? It came after a prolonged period of industrial expansion. In 1820 there were engaged in manufacture in Massachusetts 33,464 people; this number had increased to 85,176 by 1840. This development had brought about not only increased opportunities for children to work, thereby drawing them away from the schools, but it also had brought to the State a new class of children whose parents were willing and anxious to have them work because their own training, or lack of it, had not been such as to make them appreciate the value of an education. In other words, the force of educational tradition was not strong with them.

By the year 1852 it had become clear that all such children must be forced into school. Thus we see that, if we accept our definition, industrial education is merely a phase of society's progress toward universal education.

Let us now come a step nearer the present. Whatever may be true about the rest of the country, Massachusetts thought she was providing a more appropriate education for her industrial workers when she first permitted the introduction of manual training in 1884 and later required it in all cities of 20,000 inhabitants or over. In the report of a school board of that State in 1878 we read:—

The question of teaching trades in our schools is one of vital importance. If New England would maintain her place as the great industrial center of the country, she must become to the United States what France is to the rest of Europe, the first in taste, the first in design, the first in skilled workmanship. She must accustom her children from early youth to the use of tools, and give them a thorough training in the mechanic arts.

True, this statement makes no mention of the general education of the workers, but this was already assumed since the work was to be given to the children "early" and in the regular schools.

All are familiar with what happened to manual training in Massachusetts, and in other States, although some seem to overlook certain important facts in the discussion of the manual-training question to-day. The work, in spite of severe educational opposition, was sparingly introduced into those schools or grades which were rarely reached by the industrial workers for whose benefit manual training was originally intended. No wonder it "failed," as some profess to believe.

After all, just what was the failure? Principally the failure to give the work to the right boys. That is, it was introduced so high up in the "system" that it was out of reach of the future industrial workers. But this was quite natural, after all, this offering of choice things to those at or near the top, for in this respect industrial training is no exception to the general order. We all know that nearly every good thing which has been added to the curriculum has been introduced at the top of our educational system and has gradually percolated to the bottom until, eventually, the whole system has been modified by it. This, then, we may describe as the "natural" growth not only of industrial training, but of every phase of popular education.

Let us see whether there was a reasonable possibility that this process of percolation would have resulted finally in accomplishing the original purpose of industrial education.

To examine this question, let us come down to the time of the report of the Douglas Commission on In-

dustrial and Technical Education in 1906. This report made no reference to manual training except to declare that it was academically useless. It recommended the separate industrial school uncontaminated by the influences of school-teachers or regular boards of education. The latter requirement was soon dropped, however, and to-day there are few, if any, special industrial boards.

The City of Boston never organized its industrial education under a separate board. Its case is illustrative of the "natural" development of industrial education, and shows that industrial training would ultimately have worked down to the pupils who needed it.

Prior to the report of the Douglas Commission, the School Committee of the City of Boston had passed a rule, the purpose of which was to give over-aged children in the lower grades an opportunity of receiving the instruction in manual training usually reserved for the later years. Individuals might be admitted to the upper-grade manual-training classes, or special sections of such boys might be organized. Although little attention was paid to this rule at the time, it serves to indicate the tendency to carry manual or industrial training down to the people who needed it.

In the same year that the Douglas Commission made its report, the Boston School Committee established the first special class for boys who were "industrially inclined." Classes of this type are now called "prevocational," and have been established in eight different elementary districts. These "prevocational centers" are considered a part of the regular school system, are a development of the manual-arts department, and are supported from the regular school fund.

Operating under the special law which gives state aid to industrial education, if separately organized, Boston is maintaining the Trade School for Girls, the Evening Industrial School, and the Industrial School for Boys. The latter institution, the one most recently established, may well be taken as illustrative of the typical, state-aided, "separate industrial school," and so be used for purposes of comparison with the prevocational type.

The prevocational centers may thus be said to represent the natural growth, and the Industrial School for Boys the forced or specially stimulated growth of industrial education. In some respects these two types of schools are similar, in others somewhat different. In each type of school there are to be found both general and special instruction. A boy under fourteen may enter a prevocational class, but not the industrial school. The hours are somewhat shorter in the former than in the latter. The most noteworthy difference is that the prevocational boys do not have to leave the "system," and may go on to high school, if they graduate. The enrollment in the industrial school is 180 against a total enrollment in the prevocational schools of 370.

The point of all this is that the natural growth of industrial training through a development of the Department of Manual Arts has, without state aid, accomplished considerably more in the way of genuine industrial training for the fourteen- to sixteen-year-old boys of Boston than has the special, state-aided plan.<sup>1</sup>

<sup>1</sup> Obviously many things affect the enrollment of the Industrial School for Boys, but the influences which tended to keep it small unquestionably could have been met more easily under the prevocational plan.

If state aid had been given to the prevocational type of industrial education on the same basis as that afforded the industrial school (fifty per cent of the net maintenance cost), the number of boys reached could have been easily twenty-five per cent greater. This shows that, with proper direction and support, industrial education will eventually percolate down through the "system" and reach the boys for whom it was originally intended, and will do it more effectively than if organized outside the schools. Many educators are coming to feel that if state aid can be secured only by establishing a separate system of industrial schools it will be better to dispense with such aid and trust to the natural method of growth to bring this much-needed form of democratic education.

The historical phases of the work in Massachusetts have been discussed at length because nowhere else can such complete development of both types of industrial education be found. The Middle West, however, has shown its determination to bring industrial education to the future industrial workers in another way. There has been a growing tendency to open the industrial education of the high schools to selected boys of fourteen to sixteen years, even though these boys have not completed the work of the grades. Perhaps the best illustration of this tendency is to be found in the prevocational classes in the Chicago technical high schools, to which frequent reference will be made. Here we find boys, who have not completed the work of the grades, engaged in some form of mechanical work ordinarily given to high-school classes. They are doing this work and also are completing the essentials of the book work of the grades. In the Lane Technical High School

alone there are 250 such boys. It should be remembered that these boys are still in the "system" and that, in fact, many of them become regularly enrolled members of the high-school classes.

This is another most significant illustration of the fact that the industrial training, first reserved for high-school pupils, has percolated through the "system" and is now available for those boys who really need it most. This growth of industrial education has been possible because of its proximity to the regular school work, and it promises the day when the regular, public high schools will address themselves seriously to the problem of serving all the children of suitable age who stand in need of any kind of education.

## CHAPTER III

### VOCATIONAL EDUCATION A LOCAL QUESTION

As shown in the preceding chapter the whole trend of public education indicates that prevocational work is sure to become an important part of the school system. The prominence given to other types of vocational work, however, serves to blind some educators to the necessity for prevocational work, the result of the natural development of the industrial education movement. Because of state aid for vocational schools and the consequent demand for separation of vocational from general education, there has been kept before the public an agitation for separate industrial, trade, and continuation schools. This agitation has brought with it the necessity for greater accuracy and intelligence in the use of terms, and has led to the formulation of so-called definitions. These definitions have sometimes had a tendency to confine the movement within too narrow limits and to set aside as of little or no vocational value the whole field of prevocational work. A discussion of this controversy is pertinent to the most recent history of the vocational-education movement, and it is included in this study as being necessary to a clear understanding of the importance of prevocational work. It is essentially the study of what may be called the forced growth of vocational education in contradistinction to what has been referred to as the natural growth. This forced growth has been brought about through

the stimulus of direct state aid for vocational education.

State aid for education is not a new thing, but state aid for industrial education was worked out on somewhat new lines in Massachusetts. This would not interest us, as did the early educational history of Massachusetts, were it not for the fact that the Massachusetts industrial-education law is being urged as an example of what other States should put upon their statute books. In fact, it is frequently claimed that six or eight States have modeled their industrial education laws on the Massachusetts statutes. It is, therefore, pertinent to ask what principles guided the framers of the Massachusetts law.

After a general survey of the industries and the schools of the State, certain principles were decided upon. First, that two or three rather distinct types of schools ought to be organized; second, that they should be separate from the regular schools; third, that local communities establishing any one of these approved types should receive liberal state aid therefor, but that no such aid should be given for vocational work in the regular schools, however excellent the results obtained therefrom might be; fourth, that any inhabitant of the State, if eligible for membership in a state-aided industrial school, might attend any such school in the State. A resident of one town might attend a school in another without paying tuition as is usual in such cases. It is clear that this points to the desirability of developing schools of several varieties rather than of making all the schools similar. Undoubtedly this whole policy was appropriate for Massachusetts, but it may well be questioned whether it is equally so for all other States.

This brings us back again to the question of density of population. The following facts relating to the area and population of a few typical States will repay study:

Massachusetts ranks forty-fourth in area and sixth in population.

The United States in 1910 had a population of 30.9 per square mile, the Middle Atlantic States of 193.2, while Massachusetts had a population of 418.7 to the square mile.

<i>State</i>	<i>Population</i>	<i>Area</i>	<i>Inhabitants per sq. mile</i>
Massachusetts.....	3,366,416	8,039	418.7
Indiana.....	2,700,876	36,045	74.9
Illinois.....	5,638,591	56,043	100.6
New York.....	9,113,614	47,654	191.2
Maine.....	742,371	29,895	24.8
New Hampshire.....	430,572	9,031	47.6
Vermont.....	355,956	9,124	39.0
Rhode Island.....	542,610	1,067	508.5
Connecticut.....	1,114,756	4,820	231.2
Washington.....	1,141,990	66,836	17.0
Oregon.....	672,765	95,607	7.0
California.....	2,377,549	155,652	15.2
Texas.....	3,896,542	262,398	14.8

The table shows that Massachusetts has an industrial-education problem quite different from that, for example, of Indiana. It shows that Illinois is in the Indiana class rather than the Massachusetts class. Even New York is sparsely settled as compared to Massachusetts. If we ask why Massachusetts rather than some other New England State passed the first industrial-education law, the table answers us. Of course Rhode Island is in a class by itself, being largely urban.

Referring again to the Massachusetts policy of establishing different kinds of schools in different cities

and permitting the transfer of pupils, we should note that there are in Massachusetts twenty-five towns of 25,000 inhabitants or over, while Indiana has but five towns of that class. The total population of these towns is almost two thirds that of the State. If equally spaced, in Massachusetts these towns would be but eighteen miles apart from center to center. In Indiana the towns in the same class, if evenly spaced, would be eighty-five miles apart. These figures may not seem important, but in a very genuine sense they indicate that the laws of the two States ought not to be essentially the same, but rather that they should be framed in each State to suit the actual geographical and economic conditions of the Commonwealth.

This belief is forced upon one when it is seen how the regulations, with their hard-and-fast definitions relating to the maintenance of these separate industrial schools, — regulations entirely appropriate for Massachusetts, — work themselves out in the sparsely settled State. Indeed the matter of "definitions" is one which has a direct bearing on the recent development of vocational education for the following reasons: —

First, these so-called definitions are commonly not definitions at all, but are only "constructions" to be put upon certain words as used in a given law.

Second, statements which were made to facilitate the working of the law in one State should not be urged upon the country as a whole for the purpose of determining what direction the industrial-education movement ought to take.

Third, when used to determine, in advance, what form and direction industrial education ought to take in a given situation, it is more likely to deter than to

stimulate action, unless these "definitions" have been made to suit actual conditions, as determined by investigation, and have been preceded by intelligent experimentation, as in Massachusetts.

As illustrative of the first point it may be noted that the Massachusetts law provides:—

Independent, industrial, agricultural or household-arts school shall mean an organization of courses, pupils, and teachers, under a distinctive management approved by the Board of Education, designed to give either industrial, agricultural, or household-arts education as herein defined.

The law then must further define, for example, household-arts education. It does so as follows:—

Independent household-arts school shall mean a vocational school designed to develop on a vocational basis the capacity for household work, such as cooking, household service and other occupations in the household.

The Board of Education is justified in holding any school up to the fulfillment of all these requirements before granting state aid. This, however, is not a definition of household-arts education, and no one is justified in saying that a given school in some California city is not a household-arts school because it differs radically from the Massachusetts type in "organization of courses, pupils, and teachers" and because it is not put under a "distinctive management."

The second point mentioned above is the undesirability of attempting to predetermine, by exact definitions, the future development of industrial education in all parts of the country. We recognize the need of clear understanding of the terms used to describe the different types of schools, especially where state aid is concerned, but we maintain that definitions should

follow, rather than precede, the creation of the type in question. To reverse the order is to endanger the present interest in experimentation.

Progressive educators in all parts of the country have heard the demand that our school work be brought into more immediate and intimate relation with the common life. These educators have attempted to meet the new demand far more energetically than is commonly appreciated, and their experiments have been varied and purposeful. It is to be hoped that nothing in the way of exact definitions may serve to convince them that such experimentation is no longer needed, or that other and even better ways of meeting the new demand may not be forthcoming as the result of such educational activity.

Referring to the third point, namely, that when definition precedes experimentation it is likely to defer action, an example from Indiana may be cited. The Indiana law is interpreted by the State Board of Education, and the interpretation sometimes proves to be more restrictive than the law itself. This, we believe, is due to the fact that both the law and the interpretation are based, not on experimentation in the State, but on the Massachusetts statute. The law states: —

“Evening class” in industrial, agricultural, or domestic-science school or department shall mean a class giving such training as can be taken by persons already employed during the working day, and which in order to be called “vocational” must in its instruction deal with the subject-matter of the day employment and be so carried on as to relate to the day employment; but evening classes in domestic science relating to the home shall be open to all women over seventeen who are employed in any capacity during the day.

The State Board of Education says that the control-

ling purpose of an evening class in a state-aided vocational school must be

to fit the worker for more profitable employment in the occupation in which he is actually engaged. An evening school which provides instruction for wage-earners, designed to teach them another more remunerative occupation or trade or one permitting a higher degree of skill is not eligible for state aid.

The law provides that

"Industrial education" shall mean that form of vocational education which fits for the trades, crafts and wage-earning pursuits, including the occupation of girls and women carried on in stores, workshops, and other establishments.

Also that

"Industrial, agricultural or domestic-science school or department" shall mean an organization of courses, pupils, and teachers designed to give either industrial, agricultural or domestic-science education as herein defined, under a separate director or head.

Interpreting this law the State Board of Education says: —

In these schools a close relation must be maintained between theory and practice. There will be no general departments of arts or sciences, no systematic work in mathematics or drawing. . . . This being the final professional school for the industrial worker, the pupils' attendance at the school should be cut as short as may be consistent with a thorough training for the occupation or trade to be learned. . . . The shop work must be conducted on a productive or commercial basis. . . .

It should be clear that these conditions cannot be found except in a few isolated cases and that the needs of the great mass of industrial workers cannot be met under these severe restrictions. It is not strange that communities, at first enthusiastic over the prospects of establishing an industrial school or class, finally give up in despair, and, being refused state aid for things which

they need, decide that no action is desirable at the time. As claimed above, the law, or its interpretation, acts as a deterrent to the "natural" growth of industrial education.

The formulation of exact definitions of the several types of vocational education would never have been given such prominence had not the demand for a separation of cultural and vocational courses been brought into the discussion so persistently. We contend that complete separation between vocational and general education is both unnecessary and undesirable. While recognizing the fact that, for purposes of theoretical analysis, such separation is imperative and is conducive to clear thinking and definiteness of aim, in practice the two are rarely to be so clearly distinguished. Furthermore, the combination of these two elements is both natural and inevitable. The difference in result between a vocational and non-vocational class or subject is often merely a matter of emphasis. In actual practice there never has been an industrial school which did not give work which contributed both to the pupil's general equipment and to his special vocational training. The two are never found apart, but always in combination, sometimes one predominating and sometimes the other, but neither ever wholly wanting.

So one is almost inclined to ask whether, if state aid is to be had only at the cost of dividing or separating the two necessary parts of the whole, — culture and economic efficiency, — it might not be better to forego state aid altogether and to find some other way to stimulate the growth of this new form of popular education of which society stands so much in need. In other words, may it not be better to find some way of hastening and

strengthening the movement in education which we have already discussed, and which we have called the "natural" growth of industrial education?

The "more excellent way" is to convince educators, by every available means, of the great educational and vocational need of the unprogressive pupils in the upper elementary and lower high-school grades. The work already done in prevocational and general industrial classes for such children has demonstrated beyond a doubt that these children are not necessarily less able to get an education or less worthy of being educated, but frequently are merely strongly individualistic and lacking in power of adjustment to the present system. X

When the excellent and lovable personal characteristics of these pupils have once become apparent to the students of education, and when society shall have demanded that our schools address themselves to the peculiar educational problems presented by these individuals, there can be no question of the ability of American educators to find a solution of all the educational problems which their cases present.

As above noted, educators have already made much more progress toward the ultimate solution of these problems than is generally believed. There is every indication that with all the intelligent and sympathetic study which is now being given to the subject the public schools will rapidly adjust themselves to meet this new social and educational demand.

While urging the regeneration and amplification of the regular public-school system, we should not overlook the great value of the excellent work which has been done and which will continue to be done by the newer types of schools separately organized or main-

tained for giving various forms of vocational education.

One of the most far-reaching effects of such separate schools or systems will be found in their reflex action on the public-school system as a whole. Perhaps we need, for example, such excellent demonstrations of a state-wide campaign for the education of the fifty per cent as is to be found in the continuation schools of Wisconsin. A close study of these schools will demonstrate more and more clearly the particulars in which the regular school system has failed and will thereby indicate lines along which it must strengthen its work. For example, in her continuation schools Wisconsin is giving to the children between fourteen and sixteen years of age, the vast majority of whom have been "eliminated" from the public schools before graduating from the elementary grades, the manual training and simplified academic work which these pupils should have had two years before. Wisconsin is doing well to supply such instruction to these children now, but the State will eventually come to see that such work as is now being done in the continuation schools must be done in the grades, leaving the continuation schools free to do a much larger and more extended work than is possible while the regular school system remains as it is to-day.

The Wisconsin continuation schools have taught us nothing regarding the methods of educating these children between fourteen and sixteen that had not been demonstrated with absolute certainty by prevocational schools in other places, which schools, as was shown in the previous chapter, were the logical and natural outgrowth of the regular school system. The Wisconsin

plan, however, has done a great service to the cause of education by collecting in one group, or at least by bringing under one general management, several thousands of these retarded and eliminated children in such a way that an intensive study may be made of their needs, capacities, and possibilities.

Further study will undoubtedly show that all attempts to establish schools for these children between fourteen and sixteen, whether within or outside of the regular school system, are, as previously stated, but phases of the gradual progress which society is making toward universal education. To be educated, — that is the desired end, — and this is the means by which a group, until now generally overlooked by our schools, is to be educated. As before shown, the education will be both specific and general, both vocational and cultural, but the purpose is, first, last, and always, education without any qualifying adjectives whatsoever.

In conclusion, we would point out that the natural growth of popular education will be stimulated when all educators become intelligent students of the methods and purposes of the newly organized vocational and prevocational schools and classes of whatever type, and when they seek to inject into the present school system as much as may be of the vitality and directness of these new schools. When such study on the part of educators shall have become general, it is not too much to hope that the confidence which is born of the knowledge of the successful work of these new schools will speedily take effect in our regular school system. "Strong action can issue only from strong faith. Only out of certainty comes power."

## CHAPTER IV

### THE INAUGURATION OF PREVOCATIONAL CLASSES

WHEN the school authorities in any community have become thoroughly interested in the possibilities of introducing prevocational work, certain vital questions invariably present themselves. Do the conditions in the community really demand the establishment of prevocational classes? In what way are the pupils to be selected? What should be the nature of the course of study offered? What type or types of vocational work should be included? Where are the right kind of teachers to be found or how may they be trained?

The foregoing questions are all fundamentally important and are universal, but the answers to these and to other questions peculiarly appropriate to a particular community can be satisfactorily given only after a survey has been made of the local conditions both educational and vocational. Though the questions are essentially the same for all localities, the answers to them may, in fact must, differ widely in the case of different cities. It is the purpose of this chapter to present what may be called a survey of some typical community together with suggestions as to how to meet the situation revealed by the facts thus ascertained.

On visiting almost any elementary school one is sure to be impressed with the number of over-aged children in the upper grades, especially in grades six and seven. Two questions to which answers should be sought are,

first, How many such children are to be found in the school system? Second, What explanation can be given of their retardation collectively and individually?

Undoubtedly we shall find in our community certain cases where the lack of progress of the individual pupil is in no wise to be charged to the school. Illness, constant migration from school to school or from city to city, or much enforced absence may be given as examples of causes for which the school is not responsible. One prevocational boy writes, "I am no further along in school because I have went to five different schools, and every one that I went to they put me back a half a grade." In such instances it is commonly urged by the school management that, since it is in no way responsible for the cause of the retardation, the school should not be expected to remedy the difficulty or to minimize its baneful effect. The individual fits a certain grade, so far as accomplishment is concerned, therefore what more could be asked than that he be permitted to do his work in it? The fact that he is three years older and several inches taller than the majority of the pupils in the class has not been considered seriously.

In addition to these children others are likely to be found who have been regularly in attendance since entering school at five or six years of age, but who, nevertheless, are two or three years behind grade. Some of these may be subnormal. If they are, they do not fall properly within the present study, but should be cared for by special methods now well understood.

Among the remaining retarded pupils will be found some who have been "troublesome," others who are "slow," "uninterested," or "inattentive," — pupils who simply will not "apply themselves." Frequently

no better explanation can be given by the teachers than those above mentioned. But whatever may be the explanation, there are far too many children who have no reasonable hope of completing the elementary grades before they have reached the termination of their school life even though it be extended to their sixteenth or seventeenth year. It is even possible to find principals who are willing to state that certain children never could complete the work of the grades even if they had several years in which to make the attempt.

These pupils, together with the group first mentioned, are fit candidates for our prevocational class or department, but our information concerning them is not yet sufficient. What may be called a social study of the several individuals should be made.

The reason for making this social survey is that we must recognize financial limitations and parental responsibility and authority, and we must ascertain what plans the parent is making for the child's further education. "How much longer are you planning to send John to school?" may sound impertinent if the question is presented thus bluntly, yet it must be seen that the educational program of a thirteen- or fourteen-year-old boy ought to be radically affected by the knowledge that he is to be taken out of school and put to work at the end of the year. In most instances where such a social investigation is made sympathetically there will be found a considerable number of children of whom it can be stated with certainty that their school years are numbered and that the extent of them can be accurately determined by consulting the parents.

When seriously retarded children are nearing the age at which they are permitted by law to go to work, and

when their parents state that it is their intention to put the children to work as soon as possible, such children should be given prevocational work. This should be done even if retardation is the result of a faulty school system, for remedying the system will not help these individuals now, and their need should plead their cause strongly, — a cause which demands immediate action.

It is desirable, however, to make further inquiry into the peculiar organization and practices of the school in question. By so doing, the characteristics of the retarded children may be more clearly revealed, thus making it possible to care for the individual cases more successfully. It is furthermore desirable to make this inquiry in order to prevent the continuance of such methods as have resulted in the retardation of wholly normal children.

For example, it is important to know how seriously the principal and teachers take the "graded system." Are promotions made by averages? Are pupils required to repeat whole grades because they have failed in one or two subjects? Are standings based on examinations? Is knowledge of certain definite facts held to be of such importance that failure to memorize them is considered a sufficient reason for repeating the grade? In other words, is the system held in greater respect than the child? Or are instances similar to the following likely to be found? A girl failed in a certain grade and was refused promotion. Being fourteen years of age she decided to go to work rather than to repeat the grade. She was given permission to sit in the advanced grade during the year, and at the end of it she passed the examinations of both grades successfully. This incident could never have been reported from some schools. Would it be possible in our typical system?

Coupled with these investigations, the educational and social, there should be made also an industrial or vocational survey. That is to say, a careful study of the occupational opportunities open to these children is pertinent to the whole problem. There is an instance on record of an elementary school, situated just across the street from a large industrial plant, where there are no children above the sixth grade merely because the lure of the industrial occupation, with its five or six dollars a week, is too strong for the school interests to resist successfully.

It should be noted in this connection that there is a considerable difference between prevocational work and genuine industrial education in this one particular. Dr. Leonard P. Ayres, of the Russell Sage Foundation, in his "study of certain facts concerning all of the thirteen-year-old boys in the public schools of seventy-eight American cities and the fathers of the boys," has shown that industrial education need not be limited to training for occupations offered in the immediate vicinity, since working-people move about considerably and are rarely found living in the city where they were educated. With prevocational work, however, the question is somewhat different, since it is the purpose of such work to modify the influence which the early occupational years have on the young worker, and these early years are almost certain to be spent in the industries found in the vicinity of the school. Numerous personal investigations have revealed the truth of this statement, and children who have left a given school to go to work are almost sure to be found in an adjoining cigar factory or textile mill or other industrial plant. For that reason it is highly desirable, in our vocational

survey, to make careful note of the occupational opportunities which exist in the immediate vicinity for children who leave school between fourteen and sixteen years of age. Where no such opportunities exist (and there are such places to be found), the problem of pre-vocational work is greatly modified by that fact.

As illustrative of such a situation may be cited the example of a large residential city where there is but one small industrial plant, and where not more than ninety work certificates have been issued in a period of three years.

The word "survey" has been used here, and perhaps deserves a word of comment. In recent years several notable examples of school surveys have come to the attention of educators generally. One of the most recent is that which has been conducted by the National Society for the Promotion of Industrial Education at Richmond, Virginia.

Commenting on this survey, a bulletin of the United States Bureau of Education gives the following:—

#### *A Municipal Inventory*

To what extent can the worker "get on" in his job? To what extent can the city's industries give special training which they do not now provide? To what extent can the schools be a factor in preparing for vocations?

These very important questions the city of Richmond, Virginia, is making an organized effort to answer for herself. Richmond has requested a commission of experts to make an industrial and educational survey for the purpose of obtaining full information concerning the principal occupations, especially those in which young people are employed, in order to formulate plans for improving the opportunities for training and preparation for those occupations for which such training is practicable. This survey was begun the 1st of May, 1914, and is to be finished by the 15th of October.

The local forces behind the survey include the Board of Education, Board of Trustees of Virginia Mechanics' Institute, Business Men's Club, Chamber of Commerce, Rotary Club, Central Trades and Labor Council, Metal Trades Council, besides a number of employers' associations.

The findings of the survey and the recommendations of the committee are to furnish the basis of discussion at the principal sessions of the next annual convention of the National Society for the Promotion of Industrial Education, to be held in Richmond, December 9-12, 1914. There will be assembled at the convention the leading authorities on industrial and vocational education from the entire United States, who will study and pass upon the proposals, and recommend those forms of education which it is believed it will be to Richmond's advantage to carry out.

As used in our discussion, however, the word "survey" is not intended to indicate that such an elaborate inventory need be made or that it is necessary to employ a large body of educational and industrial experts. It is believed that a little sincere self-examination on the part of any school administration, if made sympathetically and with the desire to discover and to remedy any of the unfortunate conditions which are susceptible of improvement, will result in much genuine progress and frequently in the organization of successful prevocational courses.

In our typical community let us say that we have found the usual amount of retardation; that we have been able to ascertain that a small but considerable percentage of children are planning to leave school at the earliest opportunity with the full approval of their parents; that certain low-grade industrial occupations are open to them, together with the usual messenger service and odd jobs common to almost every community. The question then arises as to the meth-

organizing and conducting prevocational work in such a way as to better materially the education of these children.

It will be seen that our problem is one of adjustment between the children, their educational possibilities, the teachers, the peculiar traditions of the school in question, and the general nature of the work which the children will probably do if they leave school without some special training.

The school superintendent who urges upon his board of education or upon his teachers the formation of a prevocational class is likely to be confronted with one or more of the following questions: On what basis shall we select the children for these classes? Have we a right to distinguish between the children of the rich and the poor? Who shall determine whether or not a given child shall leave the regular class and enter the prevocational class? Would not the parent object to the segregation of his child from the school body in general? May we not actually prevent some children from "going on," — from getting a "good education," — by deflecting them from the traditional courses?

Answers to these questions, in order to be convincing, must be derived from actual experience, and it is with full knowledge of the methods of selection, of the general satisfaction of both parents and pupils with the modified work of the prevocational classes and of the success of prevocational work in general that the following suggestions are confidently made.

The plans for the prevocational class should be as carefully worked out as possible, and fully explained to the principals of the various elementary schools for the purpose of securing their coöperation. The principals

should be urged to select, with the knowledge and approval of the parents, only those children for whom the class is thoroughly appropriate. Before being asked to give their approval the parents should be informed of the nature and purpose of the prevocational work to be offered and of the benefits which may come to the children from entering the class. They should be told as candidly as possible, and by way of comparison, just what prospects the pupil has if he remains in the regular class. They should be shown that the prevocational class is an important part of the school system, and that it does not prevent a pupil from reaching high school, although it is not the primary purpose of these classes to give preparation for it. These facts clearly presented to the parents should form the basis on which they decide the question. Experience has shown that where the matter is talked over thus frankly, the parents will almost invariably decide in favor of the prevocational work. After the classes have been in operation for two or three years, and the methods and purpose of such work firmly established, parents will be influenced in their judgment by the desires of the children themselves and by the testimony of other parents whose children have had successful experience in the new classes.

Following are examples of circulars which have been issued for the information of principals, parents, or the public generally regarding the selection of children for prevocational classes. One from Boston related to a new prevocational center just organized. This was issued by the Assistant Director of Manual Arts<sup>1</sup> who is in direct charge of the prevocational work, and was intended merely for the information of the principals in

<sup>1</sup> Now Associate Director of Manual Arts.

one district. Although prevocational work had been a feature of the Boston public schools for six years when this circular appeared, it was not taken for granted that every one was fully informed regarding the purpose of the work. The circular follows.

BOSTON PUBLIC SCHOOLS  
DEPARTMENT OF MANUAL ARTS

September 20, 1913.

*To Principals of Districts in the Neighborhood of the Mather District :—*

As you know, there has been established in the Lyceum Hall an additional prevocational center. For the size, general character, length of sessions, and other information, please see Minutes of May 26, 1913. The course of study will be somewhat similar to that laid out for the other prevocational centers (please see Minutes of February 19, 1912), although the time for the academic branches will be increased as the day is to be a six-hour day, without home study; the shopwork will be given nine hours per week.

Two of the classes are in operation, and there will be opportunity for several boys from your district to enter the third class which is being organized. The kind of boys who should be considered are first those who are retarded academically, while having some facility with their hands, and who need special attention and increased constructive stimulus to enable them to graduate within a reasonable time, and, second, normal members of the three upper grades who do not intend to remain in school after the age of fourteen or graduation, and who expect to enter the trades.

This center is intended to

- (a) Put into operation before the age of fourteen an influence which may prolong school life beyond fourteen.
- (b) Enable some retarded boys to graduate earlier than under present circumstances.
- (c) Awaken in certain boys a desire for an industrial career, and offer definite opportunity for vocational guidance therein.
- (d) Point to the Boston Industrial School or the Mechanic

Arts High School after graduation rather than to the street or to some blind-alley occupation.

- (e) Afford some definite preparation for boys who do finally go to work at fourteen.

The class will be divided into A, B, and C divisions roughly corresponding with the sixth, seventh, and eighth grades, and the lowest division will certainly, and the other two divisions probably, have an equal amount of training in each of the three shops before graduation.

Each of the three classrooms is to be closely associated with some one shop, and all of the English, Mathematics, History, and Geography is to be based upon the work of the particular shop associated with the classroom. When a boy changes his shop he will change his classroom.

If you have any candidates for this center, will you kindly send me their names at an early date with a short statement concerning each candidate, giving grade, age, ability in manual training, general academic ability, and deportment. While the center is in no sense disciplinary, there is no objection to sending to it a boy whose conduct has been unsatisfactory because he was not profiting by his present course of study. If you send me the names of any candidates I will notify you when the new class will be ready to receive them.

Very truly yours,

JOHN C. BRODHEAD,  
*Assistant Director of Manual Arts.*

The following circular from Chicago marks one of the most important steps in the development of prevocational work, namely, its entry into the precincts of the high school. Here these classes use the high-school building and the high-school equipment. While the term "prevocational" appears only incidentally in the text, and not at the head of the circular, these classes in all of the high schools are called "Prevocational Classes." A new feature of these classes was developed in 1914 in the Lane Technical High School, when it was decided that any prevocational boy might be promoted

by subjects. A boy may now be regularly enrolled as a high-school boy in one subject while pursuing other subjects as a part of the prevocational class. This marks the full development of the sympathetic attention which is being given to the needs of these individual pupils. The circular shows the process of selecting the boys.

BOARD OF EDUCATION

CITY OF CHICAGO

*Office of the Superintendent of Schools*

*Department of Examinations*

*Examination for Boys and Girls Who Wish to Take Intensive  
Industrial Elementary Course*

On Monday, June 16, 1913, there will be held an examination for the following classes of pupils whose parents desire to have them take an intensive industrial elementary course: —

1. Boys in the sixth grade who are fourteen years old and over.
2. Girls in the sixth grade and upper fifth (5A) who are fourteen years old and over.
3. Boys and girls in the seventh and eighth grades who are fifteen years of age and over.

The course for boys will be given at the Lane Technical High School, the Lake Technical High School, and the Crane Technical High School, and will consist of mathematics, mechanical drawing, English, history, physiology and geography.

The course for girls will be given at the Lucy Flower High School, and will consist of cooking, hand and machine-sewing, the running of power machines, English, art, physiology and hygiene, mathematics, history, music, and physical education. Special attention will be paid to the needs of those pupils who must become self-supporting within a short time.

The examination for boys will be held at the Lane Technical High School, the Crane Technical High School, and the Lake Technical High School, on Monday, June 16, and will begin at 1.40 p.m.

The examination for girls will be held at the Lewis-Cham-

plain School, the Medill Grammar School, and the Franklin School, on Monday, June 16, and will begin at 9 A.M.

Principals and teachers will please give time to a full discussion of this subject with the pupils and their parents so that no mistake may be made through the impression that this course will be a short-cut to the high school. The work will be what might be termed "prevocational." This is not an effort to take the pupils out of the upper elementary grades; it is an effort to give the best work possible to young people from fourteen to eighteen years of age who are not likely to pursue a high school course. At the same time, the pupil who completes the elementary work satisfactorily may be admitted to the Technical High Schools.

If any of the pupils of your school who meet these requirements desire to attend the examination, you will please fill out for each one a blank, which will be sent you. This blank will serve as a card of admission and should be presented at the school at the time of examination.

Please to notify the examiner on enclosed blank not later than June 2 of the number of your pupils who will take this examination.

ELLA FLAGG YOUNG,  
*Superintendent of Schools.*

Of a somewhat more general nature is the plan described in the following instructive circular from Seattle:—

#### SEATTLE PUBLIC SCHOOLS

##### ELEMENTARY PREVOCATIONAL COURSES OF STUDY

The establishment of industrial, or prevocational, courses of study in several of the elementary schools was authorized by the Board of Directors several years ago. The classes organized in these new courses have been very successful. Reports received indicate that pupils have shown a greatly increased interest in school, and have done work of a higher rank than ever before.

These courses of study relate much more to the industries for the boys, and to household arts for the girls, than the ordinary school course. Many parents desire to give their

children the advantage of taking a course of study that provides for a training in the practice of these useful occupations and a study of their economic and efficient application in life. They believe that such a course will furnish a much more satisfactory preparation for the duties of life than that afforded by the regular academic course. It will also furnish an adequate preparation for a higher education.

In every school there are some boys and girls who prefer studies and exercises that employ their hands, and who have greater aptitude in such studies than their fellows. They advance in their development by what they do rather than by what they hear. They are practical-minded. Many such children drop out of school as soon as the law permits, not from lack of ability, but because the school fails to fit its procedure to their particular needs. The establishment of these classes in industrial arts is an attempt to fit the school to the wants of this class of pupils.

These new courses of study also provide a more practical prevocational training for a class of boys and girls in the public schools who will receive the greatest benefit from instruction which will the soonest prepare them for training in a definite vocation. Such industrial classes are not substitutes for a trade school, but for those who desire it they will lead more quickly and surely to apprenticeship in business or trade than the regular classes, while those pupils who desire to continue their study, either in the high school or special schools, are prepared to do so.

The school day is five hours, which is the same as for other grade-school classes. Three hours of this time are spent upon the ordinary school studies, modified to suit the end aimed at in this plan, and two hours are devoted to the industrial and household arts — shopwork and mechanical drawing for the boys; cookery, sewing, design and drawing for the girls.

Separate classes are provided for boys and girls because of the difference between their courses.

*Outline and Explanation of Industrial Arts Courses of Study*  
*For boys*

English  
Geography-History  
Arithmetic

Mechanical Drawing  
Shopwork

*For girls*

English

Geography-History

Arithmetic

Drawing and Design

Sewing

Cookery

English will include reading, spelling, penmanship, letter-writing and composition.

Geography will include studies of climatic conditions and influences, industries and products, exports and imports, routes and centers of trade; the studies will be correlated as far as practicable with the work in shop and kitchen.

In History there will be a review of the influential events in the development of our country, including particular reference to the country's greatest characters and their achievements, and to the causes contributing to our present national standing. The purpose will be to give an elementary knowledge of the important facts in our history, and to imbue with a patriotic desire to be serviceable. The study of Civics is included, and special attention is given to local civic problems and duties.

In Arithmetic there will be the study of fundamental operations, including fractions applied in shopwork and in other local problems, percentage and interest, applications of measurements and mensuration. The purpose will be to secure accuracy in the use of figures and practice in their application to practical affairs.

*Industrial.* The shop instruction will consist of work intended to give knowledge of materials and their sources and uses; tools and skill in their use; methods of construction; problems in machine and handwork; acquaintance with factory and individual production; the use of preservatives, as paints, oils, etc.; discussions of the various vocations; visits to work under construction, and to manufacturing and commercial establishments.

The industrial work for girls will consist of plain sewing, repairing, garment cutting and fitting; the study of household linens, and other fabrics used in the home; the use of the sewing-machine; class talks and discussions regarding clothing, its style, cost, methods of manufacture; the sweat-shop, trades and vocations for women; hygiene and home sanitation. There will also be the study of plain cooking, properties of

foods, economy, table service, sanitation, laundry work, care of the home, etc. Class talks upon related topics of home life and its obligations, domestic service, and income and expenditure will be a feature of this work.

### *The Relation of this Course to the High School*

The rank of these courses will correspond to the seventh and eighth grades of the usual school course, and will require two years for completion. At the end of the two years pupils completing this work, who choose to continue their school work, may enter the high school upon an equal footing with pupils entered from the regular academic course. Pupils who enter high school, after completing satisfactorily the full two years' work in industrial arts, will be allowed two high-school credits. Some pupils may be promoted to high school before they have finished the required manual-arts work, because of their advancement in academic subjects. These pupils will be entitled to one credit if they have done satisfactorily three semesters' work in the manual arts. If they have completed less than three semesters' work, they will be entitled to no advance credit, but will enter high school on the same basis as pupils from the regular academic courses. Opportunity will be given pupils who spend less than two years in this course to do extra work after three o'clock, in shopwork or domestic science, to enable them to earn the two credits before promotion.

### *Requirements for Admission*

This course is open to any boy or girl thirteen years of age or over, who has completed the equivalent of the present sixth grade, provided the parent or guardian makes a written request that the pupil take the industrial course, and the principal of the school last attended by the pupil approves the request. The number of pupils in each industrial class is limited to twenty-four boys or twenty-four girls.

### *Application for Admission*

Do you wish to have . . . . .  
enrolled in one of the classes taking the industrial course of study? If so, please sign your name below as indicative of your desire, detach this application, and return it to the

school. Application for admission to any class cannot be favorably considered after the number enrolled has reached twenty-four.

Yours truly,

FRANK B. COOPER, *Superintendent.*

..... *Parent or Guardian.*

Louisville, Kentucky, affords an example of extreme simplicity and purposefulness in the organization of this work, and of rigid adherence to the strictly prevocational nature of the school. A paragraph from a circular of the school states: —

Only thirty-two children could be satisfactorily handled in this initial class of prevocational training. They were, therefore, carefully selected from among children who had applied for permits to work, or who would positively leave school within a year. In order to find the children who would most immediately benefit by the training, the various districts of the city were investigated, and a factory district in the western portion of the city was selected. Following this decision, the homes of individual children were visited, and their parents interviewed. No child was permitted to enter this class if there was any intimation on the part of the parents that further schooling was considered for the child. Twenty-one boys and eleven girls compose the class.<sup>1</sup>

One difficulty which will almost certainly be met in any city of considerable size, where the individual teachers are allowed to make the selections, will be that, unless thoroughly informed and heartily in sympathy with the plan of prevocational work, teachers will select only their difficult pupils, those who are troublesome in discipline, mentally subnormal, or otherwise found to be undesirable for the regular school work. One superintendent remarked that the greatest value of the pre-

<sup>1</sup> The second year of the school (1914-15) the number was increased to eighty.

vocational class was the relief which it afforded the regular teachers by eliminating the less desirable pupils. While admitting that this benefit may be great, it should not be considered a determining factor in the problem of selecting children for prevocational classes.

This leads naturally to the discussion of the attitude of the teacher and of the school management generally toward the whole matter.

The survey of our typical community will undoubtedly show that a majority of the teachers are thoroughly in sympathy with the old plan of grading, holding the opinion that the system, in assigning a pupil to a given grade, is evaluating accurately his standing in comparison with his fellows and his actual ability to do the prescribed work of that grade. In other words, the teachers will be entirely confident that a given sixth-grade boy is rightly placed. It will be difficult to convince them that the boy might do the work of the eighth grade just as well, provided some opportunity could be given him to overcome the difficulties encountered in the first month. An occasional teacher may be found who would be glad to promote a boy on the assumption that he had the ability to do the work in a higher grade provided the teacher could "get hold of him," but, with the vast majority, the "system" will be held in high repute and the pupil will not be permitted to do any of the work in grade seven until he has "completed the required course of study" for grade six.

It must not be assumed that the teachers themselves are to be held blameworthy because of this attitude. It is rather that conditions have forced them to take the traditional point of view, namely, that this selec-

tive function of the school is of first importance. The teachers are forced to work with large classes, are required to "get results," to prepare for the next grade such children as have the requisite ability to "go on." They are obliged to use every means at their disposal to accomplish the ends which have been fixed by the authorities, including the rigid elimination of the unfit. "These are the survivals," said a school principal in showing an upper-grade class to a visitor. It is pertinent to ask, "What have they survived?" Many grade teachers would be glad to break away from this unnatural and undemocratic contest and to conduct the children more happily along paths which lead to more desirable and attainable ends.

The tendency in prevocational work is to ignore grading as far as possible and to assume that each individual is competent to do some of the work in grades much higher than that in which he is listlessly sitting, generally at the back of the room, with little or nothing to show for it at the end of the year. It cannot be stated too strongly that the attitude of the school management and of the teaching force in this one matter of grading is of first importance in determining whether or not prevocational classes are needed in a school system. Instances are on record where the plan of promotion is so flexible and the attitude of all concerned so sympathetic toward individual needs and aptitudes that there is little reason for the establishment of prevocational work. These schools are in the small minority at present, however, and the rule of inflexible, rigid, impersonal grading still holds and therefore renders necessary, or at least desirable, the organization of prevocational classes.

Undoubtedly the typical survey will demonstrate the need of a prevocational class and also will show the locality in which it should be organized. It should, as well, throw some light on the problem of selecting the teachers and the principal under whose immediate charge the work is to be carried out. The characteristics of prevocational teachers will be discussed more specifically in a later chapter, but the matter is mentioned briefly in this connection because one purpose of the survey should be to discover some of the excellent and specially qualified teachers who are undoubtedly to be found in the service. The selection of such teachers will affect the organization of the work vitally.

There should be at least two teachers, one for some form of constructive handwork and the other for the so-called "regular" subjects or bookwork. Even if the class is so small that two teachers are not required, so far as the number of pupils is concerned, it is desirable to adopt a departmental plan, drawing the teachers, for a part of their time, from other classes. Where it is possible to have three bookwork teachers, on whole or part time, such an arrangement is even more effective than that of having only one teacher in charge of the class. For example, if there could be three different teachers, it would be desirable to select one who is extremely fond of books and literature, another who enjoys teaching any kind of mathematics, and a third who has the attitude of the scientist, who likes to examine material and to do things with it, observing and recording results and ultimately drawing conclusions. All these teachers, while differing in professional qualifications, should be alike in that they recognize as pernicious the common practice of grading on a basis of

one hundred per cent without reference to the personal conditions under which the work has been done; in that they believe in the public school, but believe even more confidently in human nature; in that they are versatile, adaptable, hopeful, cheerful, and above all sympathetic with the children whom they teach. There is no school system which does not include such teachers, and a survey will undoubtedly bring to light some men or women peculiarly well qualified for the new work. They should be made to feel that the assumption of the new duties is a distinct professional advance.

The shopwork teacher should be a so-called "practical man," — one who has had shop experience, but he must be potentially a teacher. It is desirable to develop some local man who is well acquainted with the community rather than to call from a distance one who has had theoretical or even practical training; in an entirely different environment. Manual-training teachers who have spent two or three summers working in local manufacturing establishments make excellent teachers of prevocational shopwork.

The planning of courses of study and the arrangement of programs will depend upon many factors peculiar to each school system, factors brought to light in making the survey. Most of these have been touched upon in discussing the selection of children or will be taken up in detail in subsequent chapters. At this point it is desirable only to mention, in merest outline, the salient features of the class organization.

Under proper conditions and with due recognition of the additional service given by the teachers, the school day may be lengthened to six hours. When this is done, no home study should be required, though it

may be permitted or even encouraged in individual cases.

A large amount of time, preferably about one half, should be devoted to some form or forms of practical, constructive handwork.

As far as possible, and the possibilities are great, the bookwork should be related to the constructive work, at least in the beginning and until a vital interest in the particular subject has been awakened.

All work should be given without too great elaboration and should be of such a nature that the children can succeed measurably in doing it. The development of confidence and of the habit of succeeding is of greater importance than the mastery of certain prescribed facts in the book subjects, or than the development of technique or speed in the shopwork.

The purpose of giving prevocational training is always dual. It prolongs the school life of the children and it also fits them somewhat better to meet the conditions of occupational life, provided they enter such life, as they commonly do, before seventeen or eighteen years of age.

The course is not intended to deprive a pupil of further school work, but rather to devise a new means whereby some may reach the high school with its diversified opportunities. However, it is recognized that many cannot go to high school, but will find their work in the humbler occupations of an industrial life, and therefore the teaching, at all times, should emphasize the gospel of work and the essential worth of the worker.

## CHAPTER V

### PERSONAL CHARACTERISTICS OF PREVOCATIONAL BOYS

WHILE the personal factor is of prime importance in any educational work, it is, perhaps, more necessary to study the personal characteristics of the children in prevocational classes than in almost any other field. The plan of such work is one of adjustment of the school to the individual, instead of adherence to the usual practice of requiring all pupils to measure up to prescribed standards. An accurate appreciation of the peculiar personality of each pupil, therefore, is essential to the full success of the project. This appreciation can be reached most effectively through a sympathetic study of the environmental conditions under which the individual has developed characteristics which have helped to make him a misfit in the school system.

The predominant personal characteristics of prevocational pupils, which were partially revealed in the description of the methods of selecting such children, are worthy of further examination. They may be enumerated as carelessness, lack of a sense of responsibility for self-direction, intellectual reticence or modesty, physical restlessness, and mental immaturity.

It should be admitted that these characteristics are not confined to prevocational boys, but are to be found, at times, in all children; but unless these characteristics produce retardation and a chronic dislike for school

life, the case is not serious. Because of the lack of facilities in the regular school with which to meet adequately the educational requirements of children possessing these characteristics, the greater freedom and more varied methods of the prevocational class are found necessary. The failure of the regular school to interest and stimulate these pupils should not be construed as a criticism of the teachers, but rather it should be taken as an indication that a school organization must be sought where the individual differences of the pupils can be more carefully studied. Such studies have been possible with the pupils of the industrial classes at the University of Chicago and with the prevocational classes at the Lane Technical High School, Chicago, and they form the basis of the following analysis. It may be said, however, that the conclusions drawn are confirmed by testimony from a wide range of prevocational and elementary industrial schools throughout the country.

It has been noted that these pupils are careless. They are fun-loving and care-free to such an extent that they do not appreciate the restraint imposed upon them by their own duties or by the rights of others. When restraint of authority is substituted, they resent it as something arbitrary and unreasonable. Yet restraint is exactly what they need, for they are irresponsible and are ignorant of the need of self-control and self-direction. It is necessary to meet such a situation sympathetically, with little recourse to authority, and to develop gradually the pupil's ability to supervise himself. This is no easy task, and is well-nigh impossible under ordinary school conditions.

Another characteristic, which is rather difficult to

describe, may be called diffidence, modesty, or intellectual reticence. Perhaps this modesty is not always in evidence. In fact the contrary is frequently the case. Yet these prevocational boys generally show extreme reluctance to display their intellectual abilities, even when such abilities are considerable. This diffident attitude is quite consistent with the general disinclination of ignorance to expose itself. These pupils have so long regarded themselves as misfits in the school that they have hidden, as under a bushel, the light which they possess. The regular teacher, in the endless routine of school duties, has failed to appreciate many of these excellent qualities which have thus been kept in the background. Modesty is assuredly an admirable characteristic, but, in the case of the slow child, this trait is too often interpreted as stupidity or "backwardness."

The baneful effect of this modesty or reticence is augmented by the mental immaturity of the boys. Frequently they are large of body, but younger in their thoughts than other boys of the same age, especially those who are more or less precocious. By constant comparison with the younger and "brighter" pupils, the prevocational boy frequently becomes discouraged and disheartened, and finally is glad to avoid humiliation by receding into the dull gray background where he can escape observation.

If he does not do this he goes to the other extreme and becomes "troublesome." He resents criticism and direction, especially when such direction relates to tasks which he has learned to dislike heartily. Some one has said that everybody likes to learn, but no one enjoys being taught. These boys seem to resent the process of "being taught."

Prevocational pupils frequently lack power of adjustment. They do not readily adapt their rate of progress to that of the class, nor are they able to "give attention," automatically, so to speak, simply because the time has arrived for a certain lesson. One is reminded of the little primarian who, when reprimanded for not keeping her place in the reading-lesson, replied, "I can keep my place, but I cannot keep everybody else's place." It is much the same as when a military expert discovered that an army could march farther in a day if each man took his own gait instead of the regulation army step. This is figuratively true of the prevocational class.

This peculiarity is especially marked in the book subjects. As noted before, such pupils are sometimes described as "anti-book." It appears to be true, however, that they are not necessarily antagonistic to books, but rather to the peculiar use of them which school-room practice has made necessary. When these pupils are allowed to select their books, they are frequently as much interested in the use of them as the brightest pupils. A good illustration of this fact was furnished in the summer session of the industrial class at the University of Chicago. The class was in session during the entire summer, five days a week and seven and one half hours daily. The attendance was voluntary, and it naturally fluctuated somewhat from hour to hour as the different studies were presented. While satisfactory in all classes, the attendance and application were better in the hour devoted each day to reading than in any other, with the possible exception of the shopwork. Catalogued as dull and anti-book by their elementary-school teachers, the boys applied themselves with diligence, even

on the hottest summer days, to the various books and magazines which were collected with the purpose of exciting their curiosity and ultimately of training them to a habit of reading. Said one boy, "I don't like no kind of books except about how to make things." It is to be hoped that his eager perusal of *Popular Mechanics* improved his English quite as much as an equal amount of time devoted to oral reading in a "Fifth-Reader Class."

It has been noted that, for one or more of the above reasons, prevocational pupils are generally seriously retarded. They have been referred to as the "failures" in the schools. They have been thought distinctly inferior to their fellows, for how else was their belated arrival in a given grade to be explained? Have the grade teachers been wrong in their judgment? Have they overlooked or misinterpreted some of the excellent qualities which these children possess, or the unfortunate personal experiences which have helped to obscure them? It is such questions as these that the prevocational teacher must seek to answer. Because he is not forced to adhere rigidly to a prescribed program or plan, the prevocational teacher comes into a different personal relation with his pupils. As a result he has been convinced that some of the adjectives applied to such children are not wisely chosen, to say the least, and he has thus been led to study these pupils with great care.

In studying sympathetically the individual children in this group, it is generally brought to light that each one has, in himself or in his life, some quality or circumstance or limitation which has radically influenced his school progress. These qualities and circumstances

cannot be classified or discussed in the mass, but can only be revealed by the recital of several individual cases.

In presenting the following cases it is not maintained that they are unique or that they could not be duplicated in many public-school classes, but the fact remains that these personal traits and environmental conditions either had not been discovered in the grade schools which the pupils attended or that there had been no opportunity or no inclination to adapt the educational methods to the needs of these individuals. That the markedly different atmosphere of the prevocational class brought the facts to light warrants the setting forth of several illustrative personal studies.

The following quotations are selected from a large number of similar statements made by prevocational boys. Each extract is typical and illustrates a peculiar handicap under which a considerable number of these boys have labored.

#### *Change of Schools*

Age 15. "I have no mother. I went to nine different schools and every school I went to they put me down. Before I came to Lane I was in low sixth grade. Now after two semesters I am in low eighth."

#### *Travel*

Age 17. "When I was five years old I went from New York to Texas, where my father was killed. The following year my uncle took me to Salt Lake City. Then my mother married. A month later I was in Tampa, Florida. The next year I was in Alaska. I was then ten years old; I could not spell. I have been all through Yellowstone and through the Grand Canyon of Arizona. I have visited gold, silver, and iron mines. I was in the petrified forest and have lived on cattle ranches and seen cattle branded.

"My last trip was from Denver to Chicago. This is my fifth trip to Chicago. And this is the only time I ever stayed long enough to stay in school.

"My grandfather says that he will take me to North Dakota when I get an education. He will teach me to be an engineer. That is what I want to be. Both my uncles are engineers."

#### *Bad Health*

Age 15. "I was born in a little shanty and raised in poverty and not extra much happiness. I have been operated on several times and have almost lived in hospitals with these horrible operations and diseases.

"When I was seven, death knocked at our door and took my father. My poor mother has struggled to raise the four little children by scrubbing nights and washing days. She has brought me up splendid and people often remark how clean the little X—— children are. I mean to do my very best at Lane and hope that no teacher will flunk me. My mother wants me to have an education."

#### *Truancy*

Age 14. "I bummed from school because I wanted to go to work. I like Lane, but I got the fever for work. I quit, but I could not get a good job because I had no education, so I came back to Lane. I have quit three times in my life. Now my mind is made up to stay and get an education. Ever since I made up my mind my report card has been improving."

#### *Unhappy Domestic Conditions*

Age 14. "At the age of three my father took me to Canada. At five I came back and got my first look at my mother.

"When I was ten I can remember my first error. I got an awful bad chum. He persuaded me to hang away from school and I got to like it. Finally he moved and I had an awful time to stay in school.

"When I was eight my sister was born and my real troubles began. My mother praised my brother and sister and told me I was a little piece of misery. She made me stay away from school, scrub the floors, and wash the windows. When the twins were born, I had to stay home with them when she went away. Then my mother divorced my father.

"I left home and went to my father. Then I was taken to the Juvenile Court and I had to stay in a home for a year. I was taken out and got put back again.

"My father began to drink and to beat me. I came to Lane so I could stay away from home most of the day to keep away from trouble.

"Now we have a housekeeper and things have changed a little, but not the way I wish. I am disgusted."

#### *Intemperance in the Home*

Age 16. "We live in a furnished room, my father and I. My mother left me with my father and the baby is in an orphan asylum. My father got drunk when my mother ran away. I can't get my lessons when he comes home drunk. I can't sleep good either."

#### *Employment Out of School Hours to Earn Money*

Age 16. "I have an evening newspaper route of about 200 customers. In vacation I also have a morning route. On Saturdays I peddle about 300 papers.

"It is easy for me to get a job. I just ask and they generally take me on. I was going to work before I came to Lane for the *Daily News* at \$7.50 a week with chances for advancement, but seeing the advantages to be had at Lane I changed my mind.

"I do not care very much for school, but I want to graduate. I would rather work if I could get good money."

Age 15. "When in grammar school I used to work in a bowling-alley setting up pins until one o'clock at night."

Age 15. "I stayed out for a year and helped my father in his carpenter's shop.

"I can lay out all winders and stringers in a stair. I learned to lay out all stairs made in the shop. Before long the business agent from the union made me quit because I was only fifteen. I cannot join the unions for two years so I am going to school until I am seventeen."

#### *Special Inclination Toward a Vocation*

Age 14. "This has been the most unlucky year of all. I lost my father and my uncle in six months. Everything seems to go wrong.

"I thought I would like to go to Lane because I am so far back in my grades. And I came here and I like everything here but forge, which I wish I did not have to take, for I know I never will have to be a blacksmith. I want to be a mechanic because I was born with the knack to be a mechanic. I can do anything in that line. I am a good carpenter and have everything of tools there is to be had. I hope to make a good living with them some day. When I was small I bought tools one by one and now I have a great collection.

"I made an aeroplane that flew 165 feet at the Coliseum. It was three feet long."

Age 15. "I was born in Italy where I went to school five years. At eleven I started my traveling. First Paris seven months. Then Madrid five months. Then New York two months.

"Now I go to Lane to learn to be an architect. I take it up because since I was a little boy I always liked to draw. So I proved to my father that I may do good in that trade and he is very satisfied.

"I have traveled to Cincinnati, Dayton, and Indianapolis to help my father in his trade of setting up marble altars.

"On Saturdays I go to my brother's studio to work in clay and draw. I have made faces of babies and arms that show muscles and many other things. My teacher put me in the high school art class. Evenings I go to the Art Institute. I made a design for the cover of our school magazine."

Age 15. "I was sick very much and we had to move often. My father is dead and my mother works to support us.

"The trade which I would like to follow is a machinist's trade. I have been interested in steam engines all the days of my life. I like to repair and pull them apart and fix them and drive them. All I like is things going fast and making a lot of noise."

### *Temperament*

Age 14. "When I was eight years old I was put in a sub-normal room where there was a bunch of rummys and I got just like them in a short time. I was put in that room because I was so nervous. I stayed there about a year, then father put me in the parochial school for a year. Finally I came to Lane.

"I ought to be in high school long ago. I enjoy my studies and am impatient to graduate."

*Backwardness*

Age 14. "It was thought I would become a cripple and my mind unbalanced when I was born, but I am well now.

"I am very hard of learning and my grammar-school teachers thought I was lazy.

"My mother took me to my uncle's farm in Mississippi right on the Gulf of Mexico because I had heart trouble. That kept me back a year."

The following cases, perhaps, are exceptional rather than typical. They are worthy of note, however, since they serve to emphasize the complexity of the problem with which the prevocational teacher deals.

Age 17. "I am pretty good at my studies, but I can't spell. I don't talk much in company because I'm afraid people will find out my failing. I want to learn to read and spell well. Then my father will take me into his business."

This boy could not sound his letters when at the age of sixteen he came to the prevocational department of the Lane Technical High School.

Age 15. "I live with friends of my folks. I have no father, no mother. They sank with the Titanic. So did my little sister. I was sick here in America in a hospital and they did n't tell me until I got well. I never told my grammar-school teachers. Please don't tell anybody. It makes me cry if anybody talks to me about it. I don't let the boys know."

Age 16. "I was always called a tough at school until I got into seventh grade with a teacher I liked. I was just going to pass when she got sick. Then a sub came and I was n't any good after that. Now I'm ashamed when I see my chums in third-year high school."

Age 15. "I was born in Leeds, England. There the schoolmaster had a cane with which he used to beat us. Everybody hated the schoolmaster because he had a cane.

"When I started school here I was surprised to find there was no cane, and started to take life easy. The boys told me

I was smart and I got a swell head as you might say. So I failed twice and that put me back.

"I was tardy nearly all the time and the teachers scolded me nearly every day. I tried to get even with them and they tried to get even with me and so the fight was on.

"When I heard of the shops in Lane I came here to start a new life and make up what I had lost. I like my shops and work hard. I attended Lane Summer School and made up a half-year. I expect to graduate in June."

Age 15. "When I got to fourth grade it was easy and the teacher pushed me into fifth, but it got hard so she pushed me back into fourth, and for a year and a half straight they kept pushing me up and down. Later in sixth grade I got pushed down again, but the principal said I was a pretty big boy to be pushed down to that room so she pushed me up again."

Age 14. "I came to the Industrial Class (U. of C.) to learn all I could about everything and especially about machinery and mechanical drawing.

"I am so far behind in school because I did n't stick to it because I got so much English and singing. Then they cut out the arithmetic in my class and that was the end of me."

Age 15. "We have just come back from a visit to Europe. I like this school because they have shops and I am not too big for my room. Some teachers in the grammar school never see a big boy nor call on him."

Age 18. "I went to Lane two years ago and three months before graduation I got the *Wanderlust*. My dreams have all evaporated and I am back again after two years of bumming and loafing. I want to graduate and go on with my education.

"I left to go camping and I worked in an architect's office for a half a year.

"I always had a notion to go to sea. And last summer while my mother was in Europe she got a job for me to ship before the mast with the captain of the S.S. Bergensfjord. I signed up in September as a regular seaman, you understand, and I got all that was coming my way. I had a fine idea of sailing when I started, — to see the world, you know, and sail the deeps, and all that, — but when I reached Bergen, it was good-bye to the good ship Bergensfjord, and I went to Christiania to see my friend who is an army captain and a

famous "rittmeister"; that means riding-master. There I was treated like a king; it seemed that way. Some contrast, you may imagine, to a seaman's life.

"Why am I back at Lane? To get educated. After you have eaten and slept with brutes, you know what 'no education' can mean.

"Well, I would not have been worth a row of pins if I had not tried myself out. I could n't stick to school before. I don't know what I am good for, the sailing dream is still with me, but I am going to get an education, and when I go to sea again, it will be different."

Age 15. "I work in a garage. The owner is tearing a machine apart. I enjoy that. I want to be a mechanic.

"In the school I came from I did n't like literature or English, at least the way they taught it, to learn adjectives, verbs, and what kind of sentences they were.

"We had to stand in lines of threes, and we got sent to the office for everything. And were made to stay after school. They don't do any of those things here.

"They did n't want to let me take the exam. for Lane. They said I did n't need Lane because I was getting along all right. I wanted to go to Lane and then I began to get marked below 75; so here I am and I am very glad to be here."

It is obvious that the foregoing statements reveal the extreme difficulty of ministering to the educational needs of these boys, but it is the testimony of those actually engaged in the work that, great as the difficulties are, greater far are the satisfactions which are felt with every successful attempt to overcome them, because of the growing conviction that the boys themselves are so well worth while.

## CHAPTER VI

### APPROPRIATE SUBJECT-MATTER FOR PREVOCATIONAL CLASSES

THE following chapters present, in some detail, illustrative examples of concrete school material which has been found useful in educational work with prevocational pupils. The grouping of this material will indicate at once that the usual school subjects are to be given, but it is believed that the methods employed are sufficiently different from those commonly found in the elementary school to make such presentation valuable. It is desirable to devote this chapter to a preliminary discussion of the principles governing the selection, organization, and presentation of such material.

In the recent voluminous discussion regarding the organization of prevocational classes and elementary industrial schools, as a substitute for the usual upper elementary grades, it has frequently been claimed that a great mass of subject-matter, now found in the grades, must be eliminated to make room for new material more appropriate for the class of pupils in question. Even the progressive 6-3-3 plan of organization emphasizes the necessity of excluding from the curriculum of the elementary school much that has long been deemed indispensable.

At the outset, however, it should be noted that there are no new school subjects. In general, it may be said that what we have been trying to give the children

is essential for every one, but the organizer of pre-vocational work will at once establish two principles to which he will resolutely adhere and which he will urge upon his subordinate teachers for their guidance at all times. First, the pupil is always to be considered of greater importance than the subject, and his enjoyment of the school as a whole is not to be marred by undue insistence on marked progress along all lines. Second, all must acknowledge that the acquisition of a particular set of facts relating to any subject is of relatively little importance as compared with the development of a genuine interest in some one practical phase of the subject.

The old subjects are the only subjects, or certainly the most important subjects, with which the school can deal. All must learn to read and to write, to use figures wherever necessary in the ordinary affairs of life, to know enough about history to appreciate the element of growth in civilization, enough of science to understand that it means a substitution of real knowledge for mere "rule of thumb," enough physiology and hygiene to appreciate the existence of nature's laws governing the health of the individual and of society, enough technical work to inspire an interest in the industrial activities by which the majority of humanity supports itself.

It is hard to conceive of attainment to genuine success in life, under present-day conditions, that is not built upon at least a rudimentary working knowledge of practically all of these educational elements. These are found in the school curriculum to-day as a result of the working of the law of the survival of the fittest. Because they are essential they have persisted. Therefore, the demand for a reorganization of the work of

the school through the process of elimination cannot be construed to mean the elimination of school subjects. Rather it is necessary to eliminate some of the material which has outlived its usefulness in school work because it bears no vital relation to present-day conditions nor to the lives of the children who are studying in the schools. For example, history will not be eliminated, but much of the military and political material will be replaced by that which is economic or industrial in nature. Each subject includes a mass of material so great that no pupil can absorb it all in years of school life. The problem, therefore, is to find that particular portion of the material which will make the strongest appeal to the boys and will arouse in them an interest which may demand a lifetime of growth for its entire satisfaction. In other words, the usual school subjects must be vitalized or "motivated" anew.

The common practice has been to attempt to teach the principles of the subject with the hope that a mastery of such principles will enable the pupils to go forth into life and to apply them to any situation which presents itself. Frankly, it must be admitted that this procedure of teaching the principle without immediate application has rarely been successful. It certainly has not been effective with the mass of public-school children. Of course, this has been clearly recognized by educators for many years, and innumerable experiments have been made to meet the situation by providing for what is generally referred to as the concrete in education. For example, it will be admitted that most people who read and think at all find constant application for whatever knowledge they may possess regarding percentage. Human affairs are compared one with another

by means of percentage, from the standing of the baseball clubs to the condition of the child workers in the United States. In teaching percentage in schools, however, we find that, in seeking an application for the principles, the makers of textbooks sometimes overlook the real significance of "the concrete" in education. For example, the following problem from a present-day arithmetic may be cited: "Before the use of anti-toxin a physician lost 80% of his patients who were sick with diphtheria; since he has used anti-toxin he has lost only 5% of such patients. How many lives has he saved out of 620 cases treated by the new remedy?"

Undoubtedly such information as the above is important for the physician and his patients and possibly for medical students, but there is a question whether a boy of twelve will find this example any more concrete than the frankly abstract problem in percentage. In fact, with prevocational boys it is found that an elaborate and varied scheme of illustration frequently distracts the attention from the principle involved and renders the instruction even less effective than it would be if a purely abstract treatment were employed.

These boys must be led to discover that there is a real use for percentage. They may be shown, for example, that it serves to express certain facts which are needed by the machinist in planning and executing his work. In this way there may be created an interest in percentage so great that the pupil will really wish to acquire facility and accuracy in handling the process in the course of his own work in the shop or elsewhere as occasion may arise.

This procedure of maintaining an intimate relation between the shopwork and the more purely intellectual

processes constitutes genuine correlation and cannot be too strongly urged. The usual methods of education are often deplorably ineffective with the child who has no interest in the mere acquisition of knowledge and who sees no reason for making the effort which such acquisition demands. With such children, generally motor-minded, the interest which the academic work derives from its association with shopwork is often the determining factor in making school life successful. In all work with prevocational boys it is being demonstrated constantly that the chief value of the concrete is to establish an initial interest in school studies previously found distasteful.

The fact must be clearly established that the so-called "concrete" is concrete for the type of pupils under consideration only when the individual is vitally dependent upon it for the knowledge which he needs to use immediately in attaining some desired end.

With this initial interest firmly established, the necessity for a liberal amount of drill and practice becomes obvious to the pupil himself. Be this initial interest centered in doing a "man's work" in the shop, or gaining admission to the high school, or preparing to go out into the world to get a job with "good pay," achievement being the child's aim, drill and practice for accomplishing that end become enlivened, animated activities, transformed into something real and valuable because of the appreciation that such drill is indispensable to joyful accomplishment.

When the boy is as eager to perform his school tasks as to engage in a baseball contest, there is no more questioning on his part about drill in shop or lesson-room than there is regarding the practice he devotes to

acquiring skill for the ball game. To the boy it is evident that the pitcher must practice faithfully at every opportunity, while all the members of the nine must throw, catch, bat, and run bases for the purpose of rendering themselves efficient when the time comes to use that skill in defeating the opposing team. In much the same way, if the matter is rightly presented, prevocational boys will not only accept, but will accept willingly, the necessary drill in their school subjects, but they must be shown in every instance the practical application which the subject has to real life.

An adequate amount of repetition of any school subject can be secured by some such expedient as that of drawing the child's attention to the parallel between drill in school work and the infinite amount of practice performed in every walk of life in the real world. Developing speed in piecework in the factories, training for athletic competition, acquiring technique in performance on a musical instrument may be cited as examples.

Second in importance only to the proper use of the concrete is effective correlation between subjects. With the establishment of genuine interest the child himself becomes the correlating principle, since his interests reveal the need and the possibility of such correlation. When the child's actual interests and needs are overlooked, too rigid adherence to some abstract principle of correlation is likely to defeat its own ends and produce a situation more distasteful to the child than that which results from a purely abstract and isolated treatment of the various subjects.

Correlation between all subjects at every point is impossible and unnecessary. The mind works more rapidly than the hand and a natural correlation occurs

only at comparatively few points of contact; but if the two principles above stated be followed, — first, that the initial interest must be established, and second, that the child's interest must be the correlating principle, — a course of study will be developed which will be at once coherent and sufficient for the needs of the individual child.

In organizing prevocational classes, therefore, the plan commonly employed is to make the shopwork central and paramount, not, perhaps, because it really is of greater value, but because it appeals to the boys as being so. It measures up with the vocational motive which boys of this type are very likely to have at fourteen or fifteen years of age, and this vocational motive is seized upon as likely to be effective in organizing the entire scheme of shop- and bookwork.

It should not be overlooked that there are certain psychological reasons for employing shopwork, reasons which for years have been urged in support of manual training. These reasons are as valid to-day as ever, and when coupled with the more practical reasons for giving liberal attention to handwork, they present a strong case for the plan of making the shopwork the central feature and for grouping the bookwork around it.

It should be said that no particular form of shopwork can be recommended as superior for all times and all places to every other type, but this shopwork should result, where possible, in the production of such articles as can be used by the school or the community. This is one of the points of difference between the more formal manual training and the prevocational handwork.

In organizing and presenting the so-called academic work one important consideration is the use of text-

books. A feature of the instruction in book subjects in many prevocational classes is that the book is made by the pupil himself. Regarding this practice, it cannot be insisted too strongly that it is futile to hunt for textbooks in most of the subjects given in prevocational classes. Such textbooks do not exist and perhaps should never be made. For example, a textbook on *Vocational Arithmetic* will hardly fit any particular prevocational class unless it is made for that class. An effective *Textile Arithmetic*, or *Printers' Arithmetic* or *Farm Arithmetic* may be compiled, but a general vocational arithmetic which tries to cover all phases of vocational work is simply an illustration of reversion to the type, and we shall have what most school arithmetics are to-day. As above stated, the initial interest must be gained by reference to the immediate shop-work problems, or to problems arising from other school activities, and those problems cannot be foretold by the maker of the textbook unless he be the teacher of the class. In fact, the selection of "live," pertinent material, out of which the courses of study and the texts are made day by day, is one of the most important duties of the prevocational teacher. The succeeding chapters will contain liberal reference to sources of such material. In general it may be said, however, that it must be found in current literature, in shop catalogues, in government reports, in reports of labor unions, etc., etc.

The plan of having the pupils develop their own textbooks is quite in keeping with the purpose of this new type of education, since the school is expected to articulate directly with life. It is therefore natural that the material should be drawn from actual conditions

found at the present time and frequently in the immediate vicinity. A "loose-leaf system" of texts, prepared by the pupils themselves from this varied material, is almost certain to be of greater interest than the ordinary textbook, which must always be some years behind the times and must be made, presumably, to fit a wide variety of local conditions. It is the specific rather than the general which appeals to the pupils, and this is best supplied by current literature and live reports. In some schools where bookbinding is carried on, the texts are bound and presented to the pupils at the end of the year. While this work has not been developed extensively, it offers great opportunity for enriching the academic work in prevocational classes.

Some elements which are of great moment in the presentation of the subject-matter to prevocational classes are individual instruction, distribution of time, the size of classes, and the qualification of teachers.

In the presentation of material, as little class instruction as possible should be given, and then only when such instruction meets the immediate needs of a large majority of the boys, or when it is related to some subject of general interest, such as shop talks, or talks on excursions or current topics.

The common practice is to devote about one half the time to shopwork and one half to the bookwork. The apportionment of time between the several subjects, however, should be as flexible as possible. Of course, the exigencies of program-making will demand a more or less hard-and-fast division of time, but this may be varied for individuals. For example, one or more boys may be permitted or required to work on arithmetic or science or drawing during the shop period, especially if

that arithmetic, science, or drawing is immediately related to the particular shopwork in hand, and perhaps needed by the individual to explain some phases of his work. In short, the presentation of material should be made with as much reference to the individual as possible.

Perhaps no single feature of organization affects the success of prevocational work more surely than the size of the classes. A somewhat common practice, but one which cannot be wholly justified or commended, is that of limiting the classes in shopwork to a reasonable size and of combining two shopwork classes under one teacher for the bookwork. There is serious doubt whether the bookwork can be done any better than the shopwork with boys of this type grouped in large classes, though the results, or rather lack of results, are more apparent where accomplishment is measured in visible material. At all events, when the great value of the related bookwork is appreciated, every reasonable opportunity will be afforded for conspicuous success, and a small class will constitute one of the best of these opportunities. Thus, whether in bookwork or shopwork, the classes should be small enough to enable the teacher to do much individual work. These pupils, as previously shown, are markedly different, and no one method can be used successfully with all.

The argument will be made that the small classes are too expensive, but it should be recalled that the *per capita* cost of the high school is sometimes two or three times that of the grades. These children are entitled to small classes because they are essentially of secondary grade, or at least of the age which would normally admit them to the smaller classes and more expensive organi-

zation of the high school. They also deserve special consideration in view of the fact that, in all probability, they will spend but two or three more years in the day school before going out to assume the responsibility of self-support.

Furthermore, an inefficient plan is expensive at any cost, and it cannot be maintained too insistently that unless the individual can be reached in the prevocational organization the plan will lose the greater part of its effectiveness. When inaugurating such work it is better to achieve signal success with a few pupils than to conduct classes with numbers so large that the outcome is doubtful.

Finally, it is of the utmost importance that only suitable teachers be employed for prevocational classes. As noted in a previous chapter, they should be selected with great care and because of their peculiar fitness for the work, not merely because they are available or because they must be given a position somewhere in the system.

The shopwork teacher should preferably have had real shop experience and should be a competent mechanic. Nothing impresses these boys more than to see that a man "knows his business." It is desirable that he be also "an all-around man," adaptable, resourceful, and interested in other forms of constructive work besides his own specialty. If he has had professional training and teaching experience so much the better, but it should be obvious that such qualifications are not common and that they generally secure a superior position for the man who possesses them. Such men are less numerous than the positions which are open to them.

In most instances, under present conditions, the best

results will be attained by finding a local man of the right type and training him in the position. The training should include careful and sympathetic supervision by the principal of the school, attendance at teachers' meetings and conventions, the reading of pertinent literature, but especially the closest coöperation with the teacher of the academic work.

Although the work is no longer in the experimental stage, it is still in the pioneer period of its development, and the same degree of preparation cannot be expected of these teachers as is required of the instructors in the regular schools. It is too early to expect the normal schools and universities to supply such teachers in sufficient numbers. These institutions, however, are more or less alive to the situation, and several of them are making an effort to train shopwork teachers for prevocational and industrial schools.

The bookwork teacher should have had professional training and successful teaching experience in the elementary grades, preferably the seventh and eighth. It is desirable, however, that such experience should not have been so long or so circumscribed as to impress him ineradicably with the narrow ideals of the traditional school. Furthermore, success in the regular grades cannot be taken as conclusive evidence of ability to cope with the problems of the prevocational class. There are many teachers who succeed measurably in teaching the regular school work, which has been so carefully "systematized," because they have "learned their trade." They know their subjects and all the details of the particular portions which have been assigned to their grade. They are familiar with the peculiar difficulties and with the methods or devices with which

those difficulties may be met. It is easily possible, however, that such a teacher might fail lamentably with a prevocational class. Here are needed initiative, alertness, resourcefulness, cheerfulness, originality, and a wide interest. Without doubt the personal characteristics of these teachers, whether they teach the shopwork or the book subjects, are of far greater consequence than their professional training or experience. Unless they possess an instinctive love of children and a sympathetic attitude toward their idiosyncrasies, they would be better employed elsewhere, for in no educational position is there a greater demand made upon one's faith in humanity and confidence in the ultimate triumph of good over error than in a prevocational class. It is therefore upon the untiring faithfulness and the willing consecration of these teachers that the ultimate success of this great educational advance will depend.

## CHAPTER VII

### PHYSIOLOGY AND HYGIENE

IN the introductory chapter it was pointed out that the purpose of prevocational work was dual, — first, to incite intellectual activity by means of a new and more vital interest in one or more of the regular school subjects, and second, to increase the pupil's potential occupational efficiency as an insurance against incompetency should he be forced into work at the earliest possible moment.

If properly conducted no subjects have greater possibilities in both respects than physiology and hygiene. Children of prevocational age may easily be interested in a study of the body and of the laws, both physical and social, which govern its development and secure the conservation of its powers.

At first thought it may seem unnecessary to present arguments in favor of introducing the study of physiology into the course of study when instruction in this subject is required by law in so many States. It should be appreciated, however, that physiology is seldom taught to the pupils with whom this volume is dealing, such instruction being reserved for the grades which they rarely reach, or, if given in the lower grades, being of such a nature as to make little appeal to the children of this type and to have practically no effect on their mode of living. Furthermore, where the subject is taught to industrial classes it is still in its experimental stage, which fact warrants a statement of our principles

as well as of our practices. We would give briefly, therefore, the reasons why this instruction is peculiarly pertinent for prevocational pupils.

The study of physiology is, by its very nature, of genuine interest to pupils of this age, and this interest may be utilized in leading the children, not only to take better care of their bodies, but to appreciate the real value of other sciences which are more or less closely related.

The study of hygiene is perhaps even more effective as a means of developing occupational efficiency. Much thought, time, and money have been expended in developing courses of study which will contribute to the pupil's ability to take his place in the ranks of the world's workers. There are no means of evaluating this training in terms of increased efficiency, though careful observers have little doubt that such training actually enables the pupil to find his place in industry more quickly after leaving school and to fill it more acceptably. There must always be a question, however, as to just how great the advantage of this training may be over that afforded by the traditional school courses. But even a superficial examination of the facts will convince one that any improvement in the physical condition of the industrial worker will certainly increase his efficiency. Improper diet, unhygienic housing and working conditions, and any infringement of the laws of physical life result in a sapping of energy and a loss of time from sickness, which often prove a serious handicap in the competitive struggle with those more liberally endowed by nature with strong bodies, and by circumstances with more invigorating surroundings either at home or in the work-place.

While the efficiency and the period of usefulness of the workingman depend more largely upon his health than upon any other one thing, he rarely has any adequate knowledge of the effect which his mode of life and his surroundings have upon his physical health and strength. It would seem natural that the people's schools, especially those which exist primarily to secure greater efficiency in the future industrial worker, should devote a great deal of attention to a subject of such vital importance. An examination of the courses of study in the various industrial schools will convince one, however, that little consideration is usually given this subject. It will be seen, therefore, that any study or training which tends to improve the pupil's health, or to make him more intelligent regarding the laws which society has enacted for the benefit of child or adult workers, will possess real vocational value. As it will quite as certainly contribute to the pupil's culture, the study of physiology and hygiene is eminently suitable for all prevocational classes.

Authorities differ as to the best method of teaching the subject and especially as to whether a study of physiology should precede instruction in hygiene. Tolman, in his excellent book *Hygiene for the Worker*,<sup>1</sup> begins his preface with this sentence: "The teaching of hygiene fails when it is founded upon the assumption that a knowledge of anatomy is necessary."

Ritchie, in the preface to his *Human Physiology*, says: —

Neither can the desired end be reached by teaching the rules of health without an anatomical and physiological basis;

<sup>1</sup> William H. Tolman, *Hygiene for the Worker*, American Book Company.

for without such a basis, hygiene is an intangible and an elusive subject.

There are many reasons why the course in hygiene should be preceded, wherever possible, by an elementary and eminently practical study of anatomy and the functions of the various organs of the body. Some of these reasons may be stated as follows: —

1. Unless it is based on some knowledge of physiology, hygiene must be taught through mere memorizing and not through processes of reasoning.

2. To arouse the young worker's interest in hygiene without giving him some scientific knowledge of the different organs of his body may lead him to fall a prey to the first quack doctor with whom he comes in contact. If the technical and scientific terms are avoided altogether, the pupil is likely to be awed or unduly impressed by the first person whom he hears glibly using them on the street corners.

3. For children of the age with which we are dealing in this volume there is reason to believe that physiology will be more *interesting* than hygiene and therefore should precede and vitalize it. Dr. Peter Sandiford, in *The Mental and Physical Life of School Children*, says: —

Curiosity about the mechanism of the human body does not awaken before adolescence, hence it is worse than useless to try to teach physiology to ten-year-old children. But physiology to fifteen-year-olds is one of the most fascinating subjects in the curriculum.

4. There are many devices for teaching physiology which make a strong appeal to motor-minded children. For example, the mechanics of the respiratory system may be shown by means of a glass tube, the air pump,

and a small rubber bag.<sup>1</sup> *The Human Mechanism*, by Hough and Sedgwick, will be found helpful in dealing with the various systems of the body from a mechanical standpoint.

A study of such physiology as time will permit, together with the personal hygiene which quite naturally grows out of the discussions, leads logically to some consideration of "industrial hygiene" which ought to be of interest to all future industrial workers. It can be made especially valuable to them through the assistance which it may give in choosing an occupation, or, perhaps, in refraining from doing so. Such a study should seek to inform the children about their own physical powers, or lack of such, and it should also show that the peculiar advantages or dangers of a given position ought to be considered as carefully as circumstances will permit before any occupation is entered. Gradually the schools are coming to assume some responsibility in this matter. Miss Florence M. Marshall, principal of the Manhattan Trade School for Girls, says, "It would be little short of criminal neglect to permit a girl to train for a standing trade who has a flat foot." Letting this serve as a simple illustration of the two factors involved — the physical condition of the worker and the physical demands of the occupation — it is clear that a variety of data can be secured which the teacher may classify and present as best suits the educational and economic conditions of his own pupils. Further illustrations are given in one of the class talks outlined later.

It is to be regretted that industrial hygiene to-day

<sup>1</sup> Hough and Sedgwick, *The Human Mechanism* (Ginn & Co.), "Mechanics of Breathing Movements" (p. 169); "Mechanics of the Heart Beats" (p. 138); "Apparatus to Illustrate Circulation" (p. 152).

deals more with disease than with health. Since its line of attack is to abolish unhygienic conditions, it must necessarily call especial attention to the dangers and diseases which inhere in so many occupations. It may appear, therefore, that the details presented herewith serve as warnings to avoid certain positions rather than as guides to suitable occupations. It is sometimes affirmed that, since children *must* enter more or less dangerous and debilitating occupations, there is little value in taking this merely negative attitude and in warning them against doing so — that the more important thing is to instruct young people how to minimize the dangers and the harmful effects of their occupations. It must be remembered, however, that society is regulating more carefully year by year or even prohibiting the entry of children into dangerous trades, and is also seeking to reduce the dangers. The surest way to induce industry to ameliorate these unfortunate conditions is to put an embargo on the supply of necessary labor or, by other means, to render the practices expensive. The truth of this statement is amply sustained by the attitude of employers toward the “safety first” movement after the passage of a workingman’s compensation law.

There is no economic necessity for this species of human sacrifice, and the schools should ally themselves uncompromisingly with all other child-saving agencies in its curtailment or its entire abolition. Of course, for some time to come children will enter such occupations, and so the teacher should present also the positive side of the question and show the potential workers how to protect themselves in every possible way.

While, as above stated, a general interest in the sub-

ject may be assumed, it is desirable to vitalize or popularize this interest by some initial lessons intended to show the children the economic or money value of the proper care of the body. The following are suggested as sources of material for such lessons:

Bulletins of the National Safety Council, Continental and Commercial Bank Building, Chicago. There are hundreds of employers who are members of this council. They receive weekly bulletins relating to the prevention of industrial accidents and diseases as well as those common to all walks of life. The bulletins are posted in the factories or other places of employment for the information and guidance of the workmen. Membership may be secured by the payment of an annual fee of \$5.00. A copy of one of these bulletins follows: —

DISTRIBUTED BY NATIONAL SAFETY COUNCIL, CHICAGO, ILL.  
*To All Our Employees:*

*Concerning Pneumonia*

The Pneumonia season has arrived.

Not because the weather is colder — Arctic explorers do not get Pneumonia until they return to "Civilization."

Not because of raw winds, though these chill the body and thereby reduce resistance to the disease.

*Pneumonia comes at this season because people close doors and windows to keep out cold air, and thereby condemn themselves to breathe foul air in which the Pneumonia germ rejoices and multiplies.*

*Keep your houses as warm as you like. People in this country are accustomed to warm rooms, and it would be foolish to make a sudden change.*

*But see that the place where you live and work has as much fresh air as possible.*

A closed window shuts sickness IN, not OUT.

The Sanitol Educational Company, St. Louis, Missouri, publishes a set of drawings by H. Reichard which

show the growth of the teeth and indicate how necessary it is to care for them.

With judicious use, an advertisement published by Colgate & Company, Jersey City, New Jersey, entitled *Dental Hygiene*, will be found valuable.

The Metropolitan Life Insurance Company, New York, distributes, free of cost, pamphlets on *The Health of the Worker, First Aid in the Home, Milk, Teeth, Tonsils, and Adenoids*. This fact clearly indicates the money value of preserving the health, and the pupils will find in the pamphlets much excellent advice.

As mentioned above, the presentation of such material as this impresses the pupils with the fact that it "pays" to keep well.

Another method of giving a practical introduction to the subject of physiology is to discuss industrial fatigue. In this connection the teacher would do well to consult Miss Goldmark's authoritative work, *Fatigue and Efficiency*.<sup>1</sup> Answers to questions like the following may be brought out in the course of informal discussions supplemented by assigned readings from a few reference books, in which case particular pages and paragraphs should be selected to simplify the work: —

#### Questions

1. What is fatigue? (Goldmark, p. 22; Hough and Sedgwick, p. 55.)
2. Of what importance is its study to the industrial worker?
3. To what is muscular contraction due?
4. Can it be shown that this contraction of the muscles is a form of combustion?
5. What is necessary for combustion?
6. How is oxygen brought to muscles?

<sup>1</sup> Josephine Goldmark, *Fatigue and Efficiency*. Published by Charities Publication Committee, 105 East 22d Street, New York.

7. How is this oxygen carried in the blood?
8. What part in this process is played by the food we eat?
9. What are the elements in the carbohydrates?
10. What are the results of the union of oxygen and glycogen? (Goldmark, p. 22.)
11. What is energy?
12. What becomes of the heat?
13. What becomes of the carbon dioxide and other wastes?
14. What is meant by the fatigue poison? (Hough and Sedgwick, p. 60.)
15. What is the remedy for fatigue? (Goldmark, p. 25.)

Although there are no text or reference books exactly suited to the needs of the prevocational work in this subject, the following are recommended for use in the above and in similar lessons: *Good Health, Emergencies, The Body at Work, Town and City, Control of Body and Mind*, by Luther Halsey Gulick (Ginn & Co.); *Primer of Hygiene, Primer of Sanitation, Human Physiology, and Primer of Physiology*, by John W. Ritchie (World Book Co.); *The Woods Hutchinson Health Series, Book II*. (Houghton Mifflin Co.).

The practical phases of the question of fatigue may be made very real to the pupils by telling them of the studies of accidents in factories and of their relation to fatigue. The results of one such study are given herewith.

It might be claimed with justice that eternal vigilance is the price of safety in some industries. It is necessary that the operative come to his work with mind alert and muscles under good control. That he fails to present himself in this condition accounts for many industrial accidents, as the following will show: —

Statistics covering accidents in the factories of Illinois for a period of one year show that between the hours

of eight and nine o'clock in the morning there were 120 accidents, and that this number steadily and progressively increased until, during the hour between eleven o'clock and noon, 257 accidents were recorded. In the hour following the noon rest, or between one and two o'clock, there were 111, the number again increasing hour by hour until, between four and five o'clock, the maximum of 260 accidents was reached. The most reasonable conclusion is that fatigue is responsible for the increase in the number of accidents in the late hours over the number in the early hours, and raises the question why the first morning hour should not show a much lower record than it does. The difference between the early morning hour and the early afternoon hour is comparatively slight, but it is highly significant in that it points to possible personal negligence on the part of the operatives between five o'clock in the afternoon and the hour of beginning work the next morning. It brings to the front the subject of social conditions in general, and opens the questions of personal hygiene in its relation to sleeping-quarters, habits of eating, drinking, smoking, and to the nature of such recreation as may have been taken.

In this connection it is perfectly feasible to teach the pupils something about the workmen's compensation laws. While this may not be "hygiene," it grows directly out of "industrial hygiene," as it is a part of that movement which society is making to conserve the human element which enters, as such an important factor, into the industrial problem. The whole "safety-first" movement is the result of this interest in conserving human life, and valuable material can generally be obtained from large manufacturing establishments.

where the movement has been placed in the hands of one individual charged with the responsibility of reducing accidents.

This may seem a rather difficult subject for the children of prevocational age, but, in reality, is it more so than much of the technical grammar and abstract mathematics which we have required children of this age to study? Does it not come nearer to life, as they know it, than much of the history and geography? And is it not the most reasonable foundation for such practical sociology and citizenship as the young industrial worker can possibly grasp? Concrete material for the discussion of this question can be had from many sources, but the bulletins of the American Association for Labor Legislation will be found sufficiently suggestive for the interested teacher.

In addition to the information which the pupils gain from text and reference books, from what may be called commercial material, and from personal observation, it will be necessary for the teacher to give class talks himself or to secure, from time to time, the voluntary assistance of men and women from the field. As an example of the kind of discussions which will be found interesting and valuable the two following are submitted.<sup>1</sup> They are adapted from *Tolman's Hygiene for the Worker*.

*What Kind of Position should I seek?*

Before taking any position the young worker should first submit to a thorough medical examination, such as is given

<sup>1</sup> Additional material of this nature may be found in such references as the following: Sir Thomas Oliver, *Dangerous Trades* (London: Murray); William H. Tolman, *Safety* (Harper & Brothers); George H. Ireland, *The Preventable Causes of Disease, Injury and Death in American Manufactories and Work-Houses* (American Public Health Association).

in many schools to-day. This would furnish data regarding eyes, ears, chest, nose, throat, lungs, kidneys, back, hips, legs, and feet. If the individual is flat- or narrow-chested or afflicted with catarrhal or bronchial troubles, he should not work at file-cutting, painting, glass and metal grinding and polishing, stone-cutting, paper-hanging, gilding, some kinds of wood-working, grinding and cutting of mother-of-pearl and bone, nor in earthenware and china factories, because of the harmful dusts resulting from the processes employed in these industries. Neither should one seek employment as cigar-maker, tailor, shoemaker, engraver, or jeweler, because of the stooping position which must be taken in such work, thus cramping the lungs. Such persons should seek out-of-doors employment as far as possible.

Persons whose hearts are weak should not engage in occupations involving great strain upon this organ. They should not take work where there is much lifting or carrying of heavy loads, or where there is a constant strain on certain sets of muscles. Such persons are not physically fitted to become bakers, brewers, butchers, coopers, metal-grinders, millers, carpenters, weavers, stone masons, or machine-operators. They should engage in some light muscular work, but never neglect daily exercise.

Those having weak or inflamed eyes should avoid dusty trades, or those in which one comes in contact with heat, steam, vapors, and fumes. Persons who have vision in only one eye should not select an occupation where they are obliged to make accurate measurements on fine work requiring great care. Watchmakers, engravers, tailors, dressmakers, chemists, and draftsmen all require good eyesight, as the strain on their eyes is greater than in most other trades.

Persons who have broken-down arches or who suffer from varicose veins should not select occupations where they are obliged to stand for hours at a time. They should not become motormen, conductors, or bakers, nor seek work in stores or laundries.

Bricklayers, tanners, and butchers are subject to skin diseases through the handling of cement, hides, and much hot water. Persons afflicted with any inflammation of the skin should not engage in these occupations. Those who are liable

to suffer from eczema should be careful not to come in contact with acids, dyestuffs, and other materials which might increase the trouble and make it necessary to give up the work entirely. Such persons are not fitted to become bakers, bricklayers, painters, lacquerers, polishers, cooks, or laundry-workers, or to do any work where the hands are kept long in water.

Persons whose hands perspire freely cannot do good work as engravers, watchmakers, fine-instrument makers, or as workers in any of the fine metals. They are particularly unfitted for the handling of delicate materials, such as laces and linens, and for such fine, clean handwork as millinery, embroidery, sewing, bookbinding, and fine leatherwork.

### *Industrial Poisoning*

Industrial hygiene treats also of the various industrial "poisons" and of how to protect the worker from their harmful effects. One illustration only will be given here, namely, lead poisoning.

Of all the metals employed in the arts and industries, none is so widely and generally applicable as lead. Potters, cutlers, file-cutters, glaziers, lead-workers, painters, operators in electric works, typographers, plumbers, glass-workers, earthenware- and tile-makers, lead-foil-makers, shoe-finishers, employees in mirror and silvering works, some chemical workers, and those who wash lead-workers' clothing are all subject to lead poisoning.

Lead is a subtle poison. Most of its salts have no unpleasant taste or odor, are easily soluble, and produce their baneful effects so gradually and insidiously that the worker often becomes seriously ill without any preliminary warning. The symptoms need not be discussed here, but the way or ways in which the poison enters the human system and the means which may be taken to safeguard the worker will be noted briefly.

The metal gains an entrance to the body through the respiratory organs, the digestive canal, or, occasionally, the skin. Inhaled as dust, it is drawn into the respiratory passages, where it is dissolved and passed into the blood, or it may be suspended in the saliva and swallowed. On reaching the

stomach it is acted upon by the hydrochloric acid of the gastric juice, converted into a soluble salt, and absorbed.

To prevent lead poisoning the worker should keep himself in as good general condition as possible, exercise care in the selection of food, avoiding acid fruits and using plenty of milk, come to his work with his stomach well filled, and especially practice rigid cleanliness on leaving the works and before eating. A few months ago the Pullman Company, by the simple expedient of compelling the employees to bathe their hands and faces in hot water for ten minutes, both before luncheon and before going home, reduced its cases of incipient lead poisoning among its painters from seventy-five to none. One white-lead manufacturer advocates giving a free breakfast to the operatives before the beginning of the day's work, while a certain British tile works furnishes hot milk free every morning. Cleanliness with regard to the clothing is also important. In Great Britain the employer of glaze-workers, for example, is required to furnish each of his men with a full suit of washable clothes and to wash and mend them at his own expense every week.

Some of the dramatic incidents in the warfare which modern society has waged against the more deadly of the ancient diseases may be made the subjects of valuable class talks by the teacher on the general topic "Public Health a Public Duty." The following material is given as a suggestion to the teacher of a few of the illustrations which may be cited of the conquest over disease, and of sources from which similar information can be drawn. The discussion given here is not intended for the pupils themselves, but the teacher will have no difficulty in adapting to the requirements of his class the ideas which are advanced.

Dr. Edward T. Devine, in *Misery and Its Causes*, says:—

The health department and the public schools, physicians and social workers cry aloud from the house-tops the value of

fresh air; of simple, inexpensive, nourishing food; of exercise in the open air; of the practice of thorough mastication; of temperance in diet and of abstinence from drugs and strong drink. But people are slow to act upon these counsels, and they destroy foolishly and recklessly their most valuable personal asset next to good character: viz., their health. Economic necessity excuses some, but only a very little, of this improvidence.<sup>1</sup>

Perhaps one reason why the people are so slow to join whole-heartedly in the crusade against disease is because there still remains something of the mediæval attitude toward "the shocks that flesh is heir to," accepting disease as natural and inevitable or even as a just punishment for wrong doing, or a "visitation of Providence." There seems also to be a belief that men were more healthy in "the good old days" before the modern methods of fighting disease by public statutes were inaugurated.

In all ages there appear to have been some who believed that health was natural and that disease was the result of wrong living, and in modern times, as can be shown by the lowered death-rate, society has won many a conflict with the ancient enemy by enlisting the services of science. The following facts attest the truth of these statements: —

Rome and Carthage paved their streets, built sewers, and drained swamps to make their cities habitable. A later-day neglect brought to Europe frequent ravages of pestilence. Such epidemics are reported for the years 550, 1000, 1345, 1350, 1485, 1528, and 1665. The death-roll for the Black Death in the years 1345 and 1350 numbered millions. China is said to have lost at

<sup>1</sup> E. T. Devine, *Misery and its Causes* (Macmillan Company, 1911), p. 74.

that time 13,000,000. Paris lost 50,000, and London and Venice each 100,000.<sup>1</sup>

Erasmus was among the first to preach that filth was the cause of these epidemics when he rejected the divine origin of the sweating sickness in 1458-1518 and attributed it to the unclean habits of the English and the poor ventilation of their houses.

Pasteur says: "It is in the power of man to cause the parasitic maladies to disappear from the surface of the globe, if, as I am convinced, the doctrine of spontaneous generation is a chimera."

Dr. Evans says a \$10 *per-capita* health administration continued for fifteen years should eliminate consumption, smallpox, diphtheria, and typhoid; should greatly lessen scarlet fever; should halve the baby death-rate; should halve poverty and materially decrease crime; and should increase the efficiency of labor.<sup>2</sup>

Formerly historians have been too much occupied with kings, generals, dynasties and battles to give consideration to mortality tables or to causes of death other than the sword, although it is undoubtedly true that, even in times of great wars, more soldiers die or are disabled by disease than by the casualties of the battlefield.

In recent years, however, society has taken cognizance of the heavy toll which disease has levied, and has made some notable crusades against it with such battle-cries as: "No Mosquitoes — No Yellow Fever"; "No Rats — No Plague."

<sup>1</sup> *Municipal Sanitation*, Pennsylvania Health Bulletin, January, 1913.

<sup>2</sup> City Club of Chicago, Bulletin (1911), pp. 1-18.

In 1898 Ross discovered that malaria is transmitted by mosquitoes. In 1900 Walter Reed, of the United States Army, confirmed the Finlay theory of the transmission of yellow fever. At the time of Reed's discovery fever had prevailed in Havana continuously for one hundred and forty years. For half a century it had produced an average of two deaths a day in a single city. To-day, however, a more efficient sanitary organization is not to be found in America, if, indeed, in the whole world, than is maintained in Cuba. In Havana, taking a five-year period dating from 1893, the deaths from yellow fever, malaria, and smallpox amounted to sixteen per cent of the total deaths of the city. What a contrast with a similar period dating from 1903, when the deaths from these three diseases combined amounted to only .72 per cent!<sup>1</sup>

Memphis in the summer and autumn of 1878 had an epidemic of yellow fever that devastated the city, notwithstanding that one half of the people fled at its approach. In fact, the yellow-fever problem weighed heavily on the prosperity of the entire South and crippled its best efforts at development. The story of its conquest by the expedient of exterminating the mosquito which transmitted the disease is well known to all. It is a lesson which should not be forgotten.<sup>2</sup>

In Canton in 1894 an epidemic of plague broke out which in that city alone killed 180,000 people. Two years later it reached Bombay, and Dr. Blue, of the United States Marine Hospital Service, writing for the

<sup>1</sup> Dr. Hiram Byrd, *Progress of Sanitation in Florida*. The Record Company, St. Augustine, Florida, 1911.

<sup>2</sup> W. C. Gorgas, *Report of the Department of Sanitation of the Isthmian Canal Commission for the Year 1912*. Washington, 1913.

Los Angeles *Times*, July 27, 1912, said that half a million beings were dying of plague annually in India. Contrast this with the situation in San Francisco. In 1907 there were five hundred deaths from plague in that city, but the local and federal health officers, aided by thousands of enterprising citizens, undertook to destroy the rat. The work was begun in 1907 and was carried out so thoroughly that in a few months the rats were exterminated and the epidemic was brought to an end.<sup>1</sup>

A notable fact is that a decrease in the death-rate of children under five years of age has been accomplished. Some interesting tables and other matter relative to this subject are to be found in *The Woods Hutchinson Health Series*, Book II. (Houghton Mifflin Co.). *The Educational Series*, No. 21 (Board of Health, Chicago), is especially instructive. Among its various charts is one showing that, contrary to popular belief, the immigrant mother knows far less about the proper care of babies than does the better-educated native mother, the ratio of the deaths of the babies of the two classes being as 125 to 14.

In regard to the death-rate among adults, Fred L. Hoffman, statistician for the Prudential Life Insurance

<sup>1</sup> William DuPuy and E. T. Brewster, "Our Duel with the Rat," in *McClure's Magazine*, May, 1910.

L. E. Coper, *A Word to Ship Captains about Quarantine*. Government Printing Office, Washington, 1912.

This contains —

- (1) Symptoms of plague.
  - (a) Bubonic form.
  - (b) Pneumonia form.
  - (c) Quick Black Death.
- (2) Descriptions of rats.
- (3) Methods of killing rats.

Company, gives a table<sup>1</sup> showing that the greatest number of deaths in the registration area of the United States are from diseases which result from bad air and bad or poorly prepared food. That these causes should be made the subject of extensive study is evident.

Burton J. Hendrick, in his article on the "Pure Food Law," in *McClure's Magazine* for March, 1915, presents facts concerning the uses and abuses of the Pure Food Law, together with an account of the employment of poisonous dyes, flavorings, and other injurious ingredients in the manufacture of candy, ice-creams, and many foods of which children are the principal consumers. The United States Supreme Court decision in favor of the use of bleach in the manufacture of flour and the repeal of the Pure Food Law, to take effect in June, 1916, are facts of vital current interest. This article was used to excellent advantage, with one pre-vocational class, as a basis for several lessons on the Pure Food Law. If further study of foods is found desirable, good material will be found in *The Woods Hutchinson Health Series* (listed elsewhere) which contains Dr. Hutchinson's classification of foods under 'Coal, Kindling, and Paper,' together with suggestions for simple experiments to be used in testing foods for this classification.

<sup>1</sup> *Principal Causes of Death in the Registration Areas of the United States, 1908-1912.*

<i>Disease</i>	<i>Number</i>	<i>Rate per 10,000</i>
Tuberculosis.....	431,118	15.9
Heart disease.....	421,580	15.5
Pneumonia.....	369,966	13.6
Intestinal disease.....	345,186	12.7
Nephritis.....	265,665	9.8
Accidents.....	230,679	8.5

The most important and the ultimate purpose of all this work is, of course, to make good citizens. The employee often fails to see that he is a part of the great public which passes the labor laws and determines the efficiency of their enforcement by means of factory inspection and otherwise. The enforcement of state legislation for working-hours, proper water and milk supply, education of the children, sanitary tenement conditions, efficient health administration, is dependent upon the interest, activity, and intelligence of the public, of which the working-class is a large and influential part.

The first and most important step in securing hygienic rights for workmen is to make sure that they know the rights which the laws already give them. For example, the passage of the Workmen's Compensation Act in 1913 marked a revolution in the treatment of industrial-accident cases in the State of Illinois.

Where previously the injured workman had been the prey of unscrupulous, ambulance-chasing attorneys, of unprincipled employers, and of heartless claim agents and casualty companies, to-day his legal status is definitely fixed and his compensation or his death benefit automatically provided for, and the field of activity of the lawyers, both reliable and dishonest, is reduced to the minimum. Mr. Samuel Harper, attorney for the Workingman's Compensation Committee of Illinois, desires to give wide publicity to the fact that now, in that State, no attorney need be retained by the injured workman, and also to the right which the workman has of appealing to the Industrial Board in case of dispute between the employer and the employee.

What the employee can do for himself, as a citizen having equal health rights with employers, he has never

been taught to see. Perhaps the highest service which can be rendered to society by industrial hygiene is to educate the industrial classes to recognize unhygienic conditions, to coöperate with other citizens in eliminating them, and to secure the enforcement of health regulations. Where can this be done more effectively than in the schools?

## CHAPTER VIII

### HISTORY

MANY years ago Horace Mann said that, before its presentation to children, history should be rewritten. Quite recently, in his book entitled *The New History*, James Harvey Robinson, Professor of History, Columbia University, pointed out that the writers of school textbooks were governed by tradition in the selection of material rather than by the "needs, capacity, interests, and future career of the boys and girls" to whom the history is to be taught. He shows, however, that some changes have been made in the right direction. He says:—

Our most recent manuals venture to leave out some of the traditional facts least appropriate for an elementary review of the past and endeavor to bring their narrative into relation, *here and there* [the italics are ours], with modern needs and demands. But I think that this process of eliminating the old and substituting the new might be carried much farther; that our best manuals are still crowded with facts that are not worth while bringing to the attention of our boys and girls and still omit in large measure those things that are best worth telling.

This point is well illustrated by the following table, which was compiled by Professor J. F. Bobbitt, of the University of Chicago, by whose kind permission it is used herewith. It shows the average number of pages devoted to each of several subjects treated in eighteen of the school histories most commonly used.

*Elementary School Histories*

Military Campaigns.....	87.0	Our Insular Possessions.....	1.0
National Government.....	14.0	Cost of Government.....	1.0
Race Problems.....	12.8	Commerce.....	1.0
Territorial Expansion.....	11.5	Colleges.....	1.0
Elections.....	9.6	Standard of Living.....	.9
International Relations.....	9.0	Courts of Law.....	.9
Sociological Aspects of War.....	8.4	Conservation of Natural Resources.....	.8
Indians.....	6.8	International Arbitration.....	.8
Political Parties.....	5.9	Municipal Government.....	.8
Sectionalism.....	5.9	Mongolian Race Problems.....	.8
Inventions.....	5.3	National Defense.....	.8
Insurance.....	4.0	Military Training and Service.....	.8
Religion.....	4.0	Health, Sanitation, etc.....	.8
Tariff and Free Trade.....	3.7	Memorials.....	.8
Treaties.....	3.6	Struggle with Nature.....	.7
Church and State.....	3.6	Charities.....	.7
Immigration.....	3.5	Libraries.....	.7
Transportation.....	3.4	Trusts.....	.7
Growth of Population.....	2.9	Housing Conditions.....	.7
Legislation.....	2.9	Labor Unions.....	.6
Literature.....	2.8	Centralization of Government.....	.6
Local Government.....	2.7	Savings Banks.....	.6
Railroads.....	2.7	Newspapers and Magazines.....	.5
Canals.....	2.5	Electricity.....	.5
National Debt.....	2.5	Prisons.....	.5
Manufacturing.....	2.5	Social Settlements.....	.5
Foreign Commerce.....	2.3	Postal Service.....	.5
Mining.....	2.3	Care of Dependents and Delinquents.....	.4
State Government.....	2.2	Militarism.....	.4
Education.....	2.0	Neutrality.....	.4
Money Systems.....	2.0	Poverty.....	.4
Banks and Banking.....	2.0	Illiteracy.....	.4
Panic and Business Depressions.....	2.0	Irrigation.....	.4
Growth of Industry.....	2.0	Fisheries.....	.4
Taxation.....	1.9	Telephone.....	.4
Cataclysms.....	1.9	Soldiers' Pensions.....	.3
Politics and Politicians.....	1.8	Fire Protection.....	.3
Communication.....	1.8	Marriage.....	.3
Capital and Labor, Relations of.....	1.8	Women in Industry.....	.3
Army.....	1.6	Initiative, Referendum, and Recall.....	.3
Navy.....	1.6	Pure-Food Control.....	.2
World Expositions.....	1.5	Wages.....	.2
Agriculture.....	1.4	Street-Lighting.....	.2
Mexican Situation.....	1.4	Water-Supply of Cities.....	.2
Suffrage.....	1.4	Cityward and Countryward Move- ments.....	.1
Treatment of Criminals.....	1.4	Contagious Diseases.....	.1
Family.....	1.4	Cooperative Buying and Selling.....	.0
Recreations and Amusements.....	1.2	Hospitals.....	.0
Wealth.....	1.2	Minimum Wage.....	.0
Roads and Road Transportation.....	1.2	Stock Exchange.....	.0
Telegraph.....	1.1	Freedom of Speech.....	.0
Strikes and Lockouts.....	1.1	Copyrights and Patents.....	.0
Government Control of Corpora- tions.....	1.1	Child Labor.....	.0
Liquor Problems.....	1.0	Unemployment.....	.0
Peace Movements.....	1.0	Cost of Living.....	.0
Crime.....	1.0	Tuberculosis.....	.0
Factory Labor.....	1.0	Insurance.....	.0

Professor Robinson intimates that it is possible to make such a selection of material "from the boundless

wealth of the past" as will be peculiarly enlightening to a particular group of children, and he also suggests of what this material should consist if intended for children in the industrial schools.

In determining what topics should be included in a history course for prevocational children, the teachers of the experimental classes, noted in the preface, have been guided, first, by "the needs, capacity, interests, and future career of the boys"; second, by the fact that an extremely limited amount of time was available; and third, by their opinions, clarified by careful and sympathetic experimentation, as to the most fruitful lessons which the past holds for the coming industrial workers of the country. While the topics may not agree closely with those suggested by Professor Robinson, it is believed that the plan, as a whole, well illustrates the principle of selection which he sets forth so clearly.

It has been noted previously that certain subjects, heretofore reserved for high school or even for college, have been given to prevocational classes. Of course they have been simplified and made concrete and have been brought within the comprehension of those children. One such subject is history and another is economics. The two in their interrelation form an eminently practical and a truly cultural study for prevocational pupils. In other words, these children should know something of history, but the particular phases of history which will be of genuine value to them are not the political or the military phases, nor even the industrial phases, narrowly considered, but those which tell of the relation of the worker to his work and to the rest of society. It is that history which tells of the methods by which the worker has maintained himself in life and

has raised his class out of slavery to full citizenship. In this connection the teacher should not fail to consult the enlightening article by Professor Andrew Cunningham McLaughlin, Head of the Department of History of the University of Chicago, noted under general references on page 132. It is worthy of note that the American Federation of Labor has stated officially that industrial schools should teach the children, between fourteen and sixteen years of age, a sound system of "economics," including the theory of collective bargaining. The history, then, which is appropriate for these children, is economic history and might well be entitled "A History of Work and Workers."

The Manhattan Trade School considers it necessary to include such instruction in its course of study, the subject being entitled simply "Industrial Conditions." The principal of the school, in commenting on the course, says: —

This course is designed to awaken in pupils an intelligent interest in industrial questions, and to acquaint them with the factory laws in such a way that they shall feel their responsibility in helping to enforce them.

In order to give largeness of view, several talks are given on industrial history, starting with primitive forms of industry and leading up to the introduction of machinery which brought about the industrial revolution.

A discussion of the industrial revolution and its effects shows how the need for factory laws arose, and these laws are then taken up for study. Copies of the abstract posted in the factories are procured from the department of factory inspection, and those portions which relate to conditions the pupils will meet in trade are read and discussed, and suggestions are made as to ways in which workers can help in enforcing the laws.

Following this work comes a reading and study of some simple article explaining the principles of trade unions, with

the twofold purpose of familiarizing the pupils with those principles and interesting them in literature along the lines of industrial problems.

As an additional step a brief sketch is given showing the nature of the work done by such organizations as the Consumers' League and the National Association for Labor Legislation in their efforts to improve industrial conditions.

The outline given below forms the basis for the work: —

1. Primitive industries.
2. The industrial revolution.
3. Factory laws.
4. Trade unions.
5. The Consumers' League, etc.

In the preceding chapter it was shown that a study of industrial hygiene led inevitably to the conclusion that the lives of workmen are held more sacred year by year, and that greater efforts are constantly being made to conserve their interests. This fact, once established, may be taken as a starting-point for the study of "Economic History." In other words, the study of history in the prevocational class should be addressed to the problem of making clear to the children the social value of the workman as a human being. It must be shown that all other factors may be improved without advancing the interests of the workers at all. Such factors, for example, as cheaper raw materials of industry; better means of distribution; the fuller development of automatic machinery; the elimination of waste material or waste time; — all these and other improvements might be brought about without essentially changing the lot of the masses of workmen. It cannot be denied that much of the instruction given in the schools under the name

"Industrial History" entirely ignores the workman himself and merely relates to the wonderful development of modern industrial methods and the enormous increase in material commodities resulting therefrom. It should also be shown that unless the workers succeed in getting for themselves their share of the increasing benefits, at every stage of industrial progress, these benefits will certainly go, in large measure, to the capitalistic class.

By making "the progress of the worker" the dominant factor in the course a vital element common to all times will be established, which element will serve to hold together and to relate all phases of history provided the study should be continued beyond the prevocational class. Professor Frank T. Carlton, in his *History and Problems of Organized Labor*, says:—

For indefinite centuries men have been seeking for the solution of various problems relating to the toilers. Students of ancient history have disclosed the struggles of the plebeian or slave class against the patrician or ruling class centuries before the Christian era. The labor problem is a problem of all nations, of all peoples and of all centuries. The factors change, but the problem remains. History is really a story of the struggle of the mass upward; true history is a chronicle of the relations of man to man in the struggle for existence and the subdual of natural forces.

The purpose of the following course, therefore, is to give the children an elementary appreciation of the various steps in the upward progress of the worker, and especially an understanding of the organizations of labor and of capital as they exist to-day, to the end that such study may ultimately produce workmen who will have a clear knowledge of their own conditions, their own rights, and their own duties. A brief outline follows:—

## I

## INTRODUCTION

The course starts with an exposition of the more obvious features of present-day industrial conditions in order to develop a strong personal and practical interest in the study of the economic phases of history. These present-day features are as follows: The factory system of production and the saving effected by it; the modern methods of scientific management; the plan of organization of different business concerns, as, for example, the firm and the corporation; the relative advantages of working for each; the reasons for the corporation; the reasons for trade unions and for labor unions; and the relation of capital and labor.

## II

## THE STRUGGLE UP FROM SLAVERY

The next step is to outline the history of the masses as the workers have progressed through the following stages: —

- (a) Slavery resulting from conquest of the weaker tribe by the stronger.
- (b) Slavery as a condition of birth. The slave class.
- (c) Essential features of feudalism and the condition of the land slaves.
- (d) The evolution of the craftsman and his emancipation through skill.
- (e) The craft guilds; apprentices, journeymen, masters; the employers and employed frequently in the same guild.
- (f) The rapid development of the factory method of production with its specialization, large-scale production, automatic machinery, child and woman labor. These methods of production had the effect of forcing down wages and of glutting the labor market, thereby reducing large numbers of workmen to a new kind of slavery.

## III

## ORGANIZED LABOR

The development of organized labor in America, with its principles, problems, and history, is then taken up as a means of studying the methods by which the worker is raising himself again, this time from an economic slavery to an economic freedom. This concludes with a brief mention of labor in politics with a discussion of the extent to which such movements have benefited the worker.

## IV

## CIVICS OR THE WORKER AS A CITIZEN

The worker as a member of a labor organization sinks his identity. As a citizen he should stand as an individual. This conception introduces a brief study of civics in its more personal relations.

Some objection may be made to the above outline on the ground that it seems to omit many fundamentals of United States history which all children should be taught. In working out the details of the course it will be found that, if there is enough time, ample opportunity is afforded for all necessary features of such history throughout the last half of the course. For example, early American history may be introduced as a part of Section II, beginning at (e). This would include a study of the industries of the colonial period, the condition of apprentices in New England, and the economic reasons for negro slavery in the South. Ample material for this will be found in chapters II and III of Carlton's *History and Problems of Organized Labor*. Where there is a reasonable hope that the children are

to remain in school for a sufficient time, and where a genuine interest has been secured, such excursions into the more general phases of United States history should undoubtedly be made, but the paramount importance of the development of industrial and social intelligence should always be kept clearly in mind. There are several history textbooks to-day which give some attention to the factors which this course makes central and paramount, and these books can be used with great advantage. One such, for example, is *History of the United States*, by Bourne and Benton, which under such titles as "Immigration," "Indentured Servants," "Colonial Industries," etc., contains much interesting and pertinent material.<sup>1</sup>

The remaining pages of this chapter deal with the elaboration of the four sections of the subject as outlined above. Section I is introductory and also illustrates the method of presentation. Section II indicates the kind of facts which have proved interesting to prevocational classes. Sections III and IV discuss in more detail the specific purpose of the instruction given, together with brief topical outlines of the subjects treated, and reference to sources of material.

## I

### INTRODUCTION

What is history?

Why should we study history?

Besides the pleasure it gives us to know the story of how the civilized world has grown, and the help it gives us in understanding what is happening to-day, it also helps us to decide what we ought to do ourselves.

<sup>1</sup> See specific references at close of chapter.

Some day we shall vote. A knowledge of history ought to help us to vote right. One may be elected to a public office. In that case history should teach one how to be a more efficient officer.

But all of us have to work, and a knowledge of history really ought to make it possible for us to work more successfully, and to choose better what kind of work to do. Why?

Who did most of the work in the South before the Civil War?

Who did most of the work in ancient Greece?

Did these men decide what kind of work they would do or for whom they would work? Why?

Because they were slaves.

What is a slave?

Who does most of the work in Chicago to-day?

We all work.

Do most of us decide what we shall do and for whom we shall work?

In theory, yes. The wiser, stronger, better-trained men and women do choose to a large extent.

Why?

Because we are not slaves.

Can those who work in the large factories decide from day to day what they will do? Why not?

When and how did it happen that workingmen became freemen instead of slaves? Would you like to know?

History of the right kind will tell you. Shall we study it some day?

When you go to work would you like to decide what you will do and for whom you will work?

If you had the opportunity to choose would you know how?

Would you rather work for an individual, a firm, or a corporation?

What is a firm and what does partnership mean?

What is a corporation?

Can you bring to class next week the names of some (A) individuals who are in business and who employ others; (B) firms; (C) corporations?

"A" is generally written thus — J. Jones, Hair-Cutting. "B" thus, — Jones & Smith, or Jones, Smith & Co.

"C" thus, — The Jones, Smith Company; The Chicago Telephone Company.

Will you ask your fathers, brothers, and sisters who are at work whether they work for individuals, firms or corporations?

How long have there been such things as industrial corporations?

Not many years, hardly more than two or three generations. The very large corporations are sometimes called Trusts.

Why did men think of forming corporations?

The chief reason was that the production was getting to be on a larger and larger scale and few individuals could get money enough of their own to build and equip the plants, so they organized corporations, under charters from the State, and sold "shares" of stock. With the money thus secured they built factories and ran the business. The profits are divided among the "stockholders" in proportion to the number of shares they own. Thus large scale production made the corporation necessary. What is the advantage to the community of large scale, factory production?

It lowers the cost.

Would it be interesting to know how, little by little, business and industry grew to its present state?

Will that help us to see how it will still further develop?

Is factory work and business under corporation form on the increase?

More than one third of the wage-workers in the manufacturing industries of Illinois work for corporations which produce more than one million dollars worth of goods every year.

Before we go back to study the early days of industry, we ought to talk a little about the present times, and such facts as the foregoing help us to understand. Perhaps you can bring to class some interesting things about working conditions to-day.

Are there more men directing the corporations or more men working for corporations?

Which ones get the most money? Which have the most power?

What do you know about "capital" and "labor"? This is a large question, but we must know some things about these terms and what they stand for. Capitalists control their own and other people's money.

Why do workmen "organize," that is, "form unions"?

It becomes necessary to do so because the corporation is a combination of capital, and labor must "combine" to hold its own.

Would you like to study a little about "labor unions" later?

Bring to class any information about them which you can obtain from relatives or friends, especially those in unions.

## II

### THE STRUGGLE UP FROM SLAVERY<sup>1</sup>

In telling about the life and progress of an individual we might describe what he did day by day or we might show what he had achieved at different stages in his development. For example, we could describe him when, as a boy of six years, he first went to school. We might next see him when, at fourteen, he graduated from the elementary school and debated the question as to whether he would go to high school or go to work. Let us say that he took a two-year vocational course and that we find him at sixteen taking his first job. At twenty-one we see him, now a man, casting his first vote. At thirty he has perhaps just accomplished some worthy thing for which he has been working for years. Many years later we may see him, toward the close of life, looking back over it all and advising the younger men as to what things in life he had found satisfying.

In telling about the progress of the worker through the centuries we shall adopt this method and shall show his condition at six different periods of his development,

<sup>1</sup> The following is not intended to be read by the class or to the class, but is merely suggestive to the teacher.

remembering that many years or even centuries have passed between one stage and the next.

But first we may well ask the question, "Why are there those who have to work hard all the time and others who apparently do little or no laborious work?" Human nature seems to be such that few will do disagreeable work of any kind if they can make others do it for them. Furthermore, while there is always a better and an easier way of doing any kind of laborious work, the better way has almost always been "invented" or devised by the one actually engaged in doing the work. This requires ability and intelligence, and it seems that for many centuries men of ability apparently used their intelligence to get away from work by forcing the less able to do it for them. Thus a working-class was firmly established. Throughout the history of the world, therefore, masses of men and women have been compelled to do the hard, dull, disagreeable, dangerous work, — compelled in different ways, but always compelled. Do you know any of the different ways by which this compulsion has been exercised?

Another illustration of the fact that the weaker were obliged to do the drudgery may be found in the practice of the Indian "braves" who did the hunting and compelled their women to do the "work." If the women had been the stronger it might have been otherwise.

The six stages in the progress of the worker will be clearly understood by us if we talk over together the following facts and add to them from our own general knowledge and from what we can read in a few books.<sup>1</sup>

<sup>1</sup> Thurston's *Economics and Industrial History* will supply the necessary minimum for parts 3 to 6.

## 1

*The Slave by Conquest*

Perhaps the first slavery, as we think of slavery to-day, was when one small tribe fought with and conquered another and weaker tribe, and then compelled the conquered tribe to do their menial work for them, killing those who would not. The ancient Greeks and Romans had numerous slaves of this kind, men who were born free but were "thrown into slavery."

## 2

*The Slave Class*

Little by little, however, there was developed a slave class. Children were "born into slavery" and educated to service. The most familiar example to us in the United States, of course, is the condition of negro slavery before the Civil War. Perhaps more interesting illustrations can be drawn from the history of Greece and Rome, where many of the slaves were of very superior peoples, the equal intellectually of their masters.

## 3

*Feudalism*

Feudalism grew up under government too weak to preserve that order which the state should insure to all its citizens. As the government could not give this protection, the strongest men, called in England earls, barons, and lords, with their soldiers and followers, were called upon by weak freemen and small land-owners to accept their service and, in return, to give them protection. That is, the one asking for protection became, to a certain extent, a kind of slave. There were

different classes among the people who acknowledged "fealty" to the lords, but the conditions of those who tilled the soil were most nearly those of slavery as we know it. As illustrating the conditions of the serfs of the feudal system we may well take as example the villeins on the manors of England.<sup>1</sup>

Of course this kind of "serfdom" or slavery varied in the different parts of Europe and in different centuries.<sup>2</sup>

## 4

*Freedom through Craftsmanship*

During the so-called "Home Period" individuals, while doing all the work required of the serf or villein, still had a little time to work for themselves. Again, these individuals sometimes developed special ability in some one craft. Thurston notes this in an interesting way by calling attention to several English names which clearly indicate this fact. While all had to be farmers, some became known as Carpenter, Baker, Butcher, Smith, etc., because they had become especially proficient in the craft in question. Suggest other names: Weaver, Webber, Mason, Fisher, Wheeler, Taylor, Tyler, etc.

In process of time the craftsman came to devote all his time to his trade. It also developed that these craftsmen gathered in towns where work could be found, since now the work was not done directly for the consumer. As the man became a craftsman instead of a farmer he was less restricted in his movements from

<sup>1</sup> See Thurston, pp. 52 to 55.

<sup>2</sup> Note the date as given by Thurston for this English example. William Hard says that "in 1807 two thirds of the inhabitants of Prussia were serfs, bound to the soil."

place to place, though he was still subject to many regulations which do not exist for workmen to-day.<sup>1</sup> He was much less a slave to a master, though he might be a slave of "circumstances."

The craft guilds imposed regulations, but the workman was a member of the guild and so had something to do with making these regulations. On the whole we may say that through the skilled craft the workman finally became a freeman.

## 5

*The Worker and the Guild*

How for a time the skilled worker maintained himself as a freeman, during the early days of the wage system, must be studied in the guilds. There is much that may be said about them, but, for our particular study, — i. e., the rise from slavery to freedom, — it is most interesting and pertinent to note the discussion given in Thurston on page 77. This shows that the skilled workman was, to a considerable extent, "his own master." It also shows that this condition cannot last long, since it has in it the seeds of its own destruction. It also shows us why, and indicates that strength for labor can be permanent only by making it equal with capital. Although his position is not to last long our skilled workman is free. Has he, with the capitalist, forgotten the unskilled and the learners? Is this his weakness?

## 6

*Conditions leading to a New Slavery*

The conditions which eventually broke down the advantage thus far gained by the skilled worker were

<sup>1</sup> Thurston, p. 176.

specialization, large-scale production, and automatic machinery which utilized unskilled labor, including the labor of children and women.

These resulted in an over-supplying of labor, thus forcing down wages, making work irregular or uncertain, narrowing the "margin of safety," to say nothing of comfort, making the worker dependent on the capitalist for "the opportunity and the right to work," and actually producing, for many thousand people even in this rich country, what the socialists call "wage-slavery."

This leads directly to the history and problems of organized labor, the purpose of which is again to enable the worker to struggle up, with a larger percentage of all workers, including this time, let us hope, not merely the highly skilled, but all who can be helped by standing together for the good of all.

### III

#### ORGANIZED LABOR

The purpose of discussing organized labor with these boys is to emphasize the general efficacy of organization in social and industrial activities and to develop a more discriminating attitude toward that particular kind of organization adopted by wage earners, that is, the labor unions. It is believed that children of the prevocational type and age should be taught some simple facts and principles which will enable them to interpret more intelligently the loosely expressed public opinion relating to the labor question and which will give them a basis for judgment about a matter not far removed from their present interest.

It should be recalled that the general public seldom

takes any vital interest in labor organizations except in times of labor disputes. At such times the public frequently suffers some discomfort and its judgment is warped accordingly. It is therefore quite common to hear indiscriminate criticism of labor unions in general because of the unlovely aspect of some phases of organization which develop during prolonged and bitter strikes. This tendency to unfavorable criticism of the unions is still further strengthened because the capitalist employer more easily gets his facts and opinions before the public. All this is unfortunate, as it tends to create a support of unionism which is equally prejudiced and unthinking. For these reasons it seems desirable to begin the discussion of labor organization with a consideration of the case against the unions.

This should be followed by a statement favorable to unionism, showing the nature and the purposes of organization, and the whole should conclude with a brief sketch of the growth of unionism in the United States, showing especially the broadening conception from isolated "trade" unions to federated "labor" unions. It will be found worth while to make a study of certain locals known to members of the class. A discussion of the building-trades unions is interesting in almost any locality. Some facts about apprenticeship, its history and present requirements, are naturally evolved from this work and make a strong vocational appeal to the boys.

A brief topical outline follows: —

#### *The Case against the Unions*

1. Unfair discrimination in limiting membership in the union and the number of apprentices.
2. Submission to unwise and self-interested leaders within the union.

3. Limitation, to an unjustifiable degree, of the amount to be accomplished in a day's work.
4. Occasional unjust demands when in complete control of the situation.
5. Unnecessary strikes involving innocent parties.
6. Picketing and the violence sometimes resulting therefrom.
7. Sympathetic strikes which involve the breaking of contracts.
8. Destruction of property in carrying on strikes.
9. Ban on prison labor.

The above may be discussed from three points of view, — injustice toward the public; injustice toward the employer; injustice toward fellow-workmen outside the union, and sometimes toward union members who disagree.

#### *Needs and Purposes of Labor Unions*

1. Labor organization is necessary to counterbalance capital organization as typified in corporations and employers' associations.
2. A union can give an effective expression of the opinions and needs of its members, and to some extent of the masses.
3. The individual wage-earner cannot treat successfully with his organized employer, capital frequently representing many employers, though managed by a few directors.
4. It is necessary to bargain collectively about wages, hours, and employment conditions of labor, and is as justifiable as for a wage-earner to bargain individually about the labor he sells.
5. A continuous and strong organization of workers is necessary to procure and maintain suitable employment conditions for its members.
6. The unions protect the employer against some bad practices growing out of competition in the industrial world.
7. Many unions promote social activities, educational improvement, and the establishment of sick benefits.

Presentation of the above material should show clearly that unions cannot be strong from their beginning, but must grow, and that society should be patient with them through the early stages of their development.

### *Historical Sketch*

1. Name, date, and place of a few of the earliest trade unions.
2. Some statement regarding the size of their membership.
3. Date of the first "federation" and some statement of the present extent of the American Federation of Labor.
4. Statement regarding the Industrial Workers of the World.

### *Results*

The work should conclude with a discussion of the results achieved by organized labor, such as the securing of better working conditions and wages, shorter hours, improved child labor and compulsory education laws, and a growing tendency on the part of capital to "recognize" the union.

### REFERENCES FOR THE TEACHER

*The Labor Question.* Washington Gladden. Pilgrim Press.  
(Suggestive of the idealism of organized labor.)

*History and Problems of Organized Labor.* Frank Tracy Carlton. D. C. Heath & Company.

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Guild system.....	16
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## IV

## CIVICS FOR THE WORKER

A complete study of civics is not contemplated. The work given is merely intended to create an interest, on the part of the potential worker, in such phases of the subject as will reveal to him something of his personal responsibility to society.

Two points are emphasized especially, — first, what the worker can do to promote civic progress, and second, what the worker should know about civic organization. Under the first point are discussed the worker's rights, powers, and duties, and the way in which he may exercise them. Special emphasis is laid on the fact that some of these duties may be entered upon even while the individual is a schoolboy. Under the second point are considered those things which society has done specifically for the protection and advancement of the worker.

The work is planned on the assumption that the pupil will build best upon his personal experiences and that an awakened interest in his own relations to society is of far more value to the worker than a mere knowledge of the details of civil government. The course,

therefore, draws largely on such material as the children can investigate for themselves, though an attempt is made to lead out to civic activities in general.

The subject may well be introduced by some review work in hygiene and sanitation, showing sanitation to be a civic duty. The following topics have been used successfully with prevocational boys and have furnished excellent lessons for stimulating the practical exercise of their civic duty: —

Smoke laws.	Tuberculosis.
Ventilation.	Milk supply.
The fly.	A clean city.

Following is an outline adapted from a bulletin issued by the Woman's City Club, of Chicago, and used in presenting the first of these topics, together with a brief discussion of the methods employed and the results obtained: —

### *The Smoke Nuisance*

1. Reduction of smoke in the city of Chicago during the last eight years was shown by diagrams representing two chimneys labeled as follows: —  
 1907 — 100% smoke.  
 1915 — 37% smoke.  
 Result — 63% reduction since 1907.
2. Extracts from smoke law: —  
 For stationary plants: — Smoke may not be emitted for more than six minutes every hour.  
 For tugs and locomotives in motion: — Dense smoke may not be emitted for more than one minute every hour.
3. Proportions of dense smoke issuing in city: —  
 Miscellaneous power plants..... 54%  
 Locomotives..... 27%

Central district.....	8%
Flat buildings.....	5%
Private residences.....	4%
Boats.....	2%

4. Suggestions for reduction of smoke: —

- Electrify railroads.
- Use hard coal on boats.
- Heat by gas or coke.
- Establish central power and heating plants.
- Demand intelligent methods of firing.

5. Loss to city: —

- Health.
- Property.
- Cost of labor.
- Fuel combustion.

The outlines were entered in notebooks and various bulletins and diagrams were made by the pupils. Visits were made to the City Hall for information. One pupil called at the office of the City Smoke Inspector and secured a large amount of material, including charts, curves, maps, reports, and official blanks. On the boy's invitation, the Assistant Inspector gladly visited the school and delivered a lecture, well illustrated by lantern slides.

Several children became sufficiently interested to use the official blanks, reporting in class and to the City Smoke Department cases of violation of the smoke ordinance. They also collected news items, cartoons, and editorials relating to the problem, clipped from magazines and the daily papers.

In addition to giving the pupils some conceptions of what they may do to promote social welfare, it is desirable, as noted above, to teach them a few elementary facts regarding political organization and some

of the laws which have been enacted with special reference to the worker. Organized society has evolved, through years of experience, the several organizations with which we are all so familiar, but which should be brought to the attention of the children. Among others may be mentioned the following:—

City.	The water system.
Wards.	The school system.
Taxes.	Franchises.
City officials and their duties.	Political parties.
Fire department.	The ballot.

All of this work should be taken up quite simply, and generous use should be made of maps of the city and its wards, and bulletins and pictures issued by the various departments. Diagrams especially appeal to these boys. As an example may be cited the simple device of illustrating, by a divided circle, the distribution of the city's taxes. An interview with any city official does much to make the business of running the city seem real to the pupils.

The consideration of laws passed by society to protect the worker may be introduced by reference to the "safety-first" movement. It will be recalled that this movement grows naturally out of the discussion of social hygiene, and also from the study of economic history. The course in civics, therefore, may conclude with brief references to a number of these movements, such, for example, as the following: —

- The promotion of workmen's compensation laws.
- Child labor laws.
- Study of unemployment.
- Establishment of a Vocational Guidance Bureau.
- Establishment of the Juvenile Court.

The outline of the first of these topics is given here-with: —

### THE WORKMEN'S COMPENSATION LAW

The material has been organized in two parts. The first part deals with the primary purpose of the law and shows something of what has been accomplished; the second part consists of a study of the basic principle of the law.

#### *1. The primary purpose is prompt compensation for injury* (Extracts from what has been accomplished in Illinois.)

##### 1. Table of compensation rates in Illinois.

<i>Loss of member</i>	<i>Percentage of wage</i>	<i>Number of weeks</i>
Thumb.....	50	60
First finger.....	50	35
Second finger.....	50	30
Third finger.....	50	20
Fourth finger.....	50	15
First phalange (one half of finger loss).....	50	
Two phalanges (one finger loss) .	50	
Great toe.....	50	30
Any other toe.....	50	10
One hand.....	50	150
One arm.....	50	200
One foot.....	50	125
One leg.....	50	175
One eye.....	50	100

2. Rates of compensation a necessity in order to guard against dishonesty and abuses of compensation laws.

3. List of occupations in which compensation is allowed for injury.

4. Extent and growth of workmen's compensation measures.

Forty-one foreign countries, including all European

countries excepting Turkey, and twenty-four States of the United States, have compensation laws.

In the United States twenty-seven commissions, not including federal, have been appointed since 1910 to work on the matter.

New York was the first State to enact compensation laws. This action was taken in 1910.

Illinois enacted laws in 1911 and again in 1913.

*II. The basic principle is that loss through accident shall be made a charge upon industry*

1. Losses incident to industrial activities.
  - a. Employer bears loss in capital.
  - b. Workman loses life or limb and money, the latter in wages and doctor's bills.
2. Ways of dealing with injury other than by legal compensation.
  - a. Liability insurance.
 

\$22,000,000 was paid by employers to liability insurance companies in 1908 to carry their accident risks.

\$5,500,000 finally reached the workmen.

\$16,500,000 ——— ?
  - b. Common law.
 

Three defenses made: fault of fellow-workers; workman assumed risk; negligence.

Only the latter is a reasonable defense. The two first are unfair to the worker, and the last is difficult to trace to its source and the employer is apt to lose through an unfair jury.
3. Justice of law.
 

The law should be:

Liberal as may be to worker and dependents.

Fair to employer.
4. Extracts from model laws.
 

Extracts from Illinois law.

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It should be noted in conclusion, that both "Hygiene for the Worker" and the "History of Work and Workers" lead naturally and inevitably to "Civics for the Worker."

This whole subject must be treated mainly by the "lecture method," since little reading can be expected of the boys, owing both to the nature of the material and to the extreme difficulty of finding any connected presentation of it simple and brief enough to come within their comprehension.

The value of the subject, however, will be all but lost unless the teacher can succeed in stimulating the imagination, thus making the subject vital and vivid. This can be done by interpreting the "lecture method" as a "story-telling method" and by enriching the material in every possible way. The teacher should be able to get from the few references, given at the end of this article, interest and information sufficient to carry the work to a successful issue, provided too much is not demanded of the pupils. Frankly, little of the traditional kind of reaction can be expected, but the thoughtful teacher will value far above this the eager and discriminating questions with which the young students of "economic history" ply their instructor. He will probably be unable to answer all these questions, but so

much the better, because an entirely new relationship will have been established and both teacher and pupil have much to gain thereby.

But of course the boys must be given something to do. At the beginning the principal source of information for the boys, aside from the "lectures," should be the people whom they can question outside the school, — their relatives and friends. It follows, therefore, that the school period must be given almost wholly to "story-telling" and "round-table" discussion. The teacher may be surprised at the amount and variety of information contributed by the boys.

A little later the pupils can be assigned short, well-chosen references to read. These should be carefully marked and definitely limited, and should be easily accessible. They can be chosen from a variety of sources, some of which will be noted at the close of the chapter.

From the beginning the pupils should keep notebooks. The "notes," however, should be largely dictated by the teacher at the close of the general discussion. If, in the beginning, these notes consist of but one question a day, together with the briefest possible answer, legibly written, the teacher should be satisfied. In this way a textbook, meager, to be sure, is built up little by little. The joy of the pupils as they look back two or three weeks and realize that they know the answers to the various questions is, in itself, ample proof that the subject is vital and that the method is sound.

In place of the pupil's ability to give certain historical facts and dates, the teacher of this kind of history must be glad to accept an enthusiasm for the discussion

of the question presented and a growing interest in, and intelligence about, our marvelous, complicated, twentieth-century industrial life. When carried out as above suggested and by an enthusiastic teacher, such results may be confidently predicted.

#### LIST OF GENERAL REFERENCES

(For the teacher)

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- The Labor Question.* Washington Gladden. The Pilgrim Press.
- The Community and the Citizen.* Arthur William Dunn. D. C. Heath & Company.
- Preparing for Citizenship.* William Backus Guitteau. Houghton Mifflin Company.
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- History of the United States.* Bourne and Benton. D. C. Heath & Company.
- Meaning of the Civil War.* Article by Andrew Cunningham McLaughlin, The University of Chicago. The University Record, July, 1915. Page 138-148.

#### SPECIFIC REFERENCES

(For the pupils)

- A School History of the United States.* William H. Mace. Rand, McNally & Company.

	<i>Pages</i>
<i>Colonial life</i> . . . . .	95-117
Social classes . . . . .	98
How social differences were shown . . . . .	99
Social life . . . . .	100-101
The Patroons . . . . .	79
<i>Industrial and social development from</i> <i>Washington to Civil War</i> . . . . .	279-294

<i>The New Industrial Era</i> .....	415-446
Corporations .....	439
Growth of labor organizations .....	439
Strikes .....	440-442
Railroad and other strikes (1877-1886) .....	440-441
Chicago Anarchists (1886) .....	441
Homestead strike (1892) .....	441
Coal strikes (1900-1902) .....	442

*A History of the United States.* S. E. Foreman. The Century Company.

Early America a place for laborers and work one hundred years ago .....	23-29
Slaves and indentured servants .....	82-83
Occupations, 1700 .....	83
Farm implements, 1800 .....	179
Inventions, manufacture, and transporta- tion .....	180-183
Everyday life .....	183-184
National roads, 1818 .....	207
Steamboats .....	207-208
Life in Middle West (in early days) .....	210-212
Development (industrial), 1820-1840 .....	239-248
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The New West .....	375-386
Present-day progress .....	410-418

*Elementary American History and Government.* Woodburn and Moran. Longmans, Green & Company.

<i>Colonial life</i> .....	105-116
Erie Canal .....	253
<i>Industrial development, 1798-1829</i> .....	256-276
Tools .....	257-258
Livestock; patents .....	258-259
Steam engine (1769) .....	259
Manufacturing .....	259
England and inventions .....	260
Slater's Mill .....	260
Cotton gin .....	260-262
Wool, iron, hard coal .....	262-263

Humble inventions .....	263
Commerce .....	263
Shipbuilding .....	264
Westward movement and Western pio- neering .....	264-269
Fulton, steamboats, Erie Canal .....	270-273
General progress .....	276
<i>Social and industrial progress, 1829 to 1865</i> .....	375-389
Canals, railroads, manufactures, discov- eries, etc. ....	376-388
Physical and economic union of the States .....	389
<i>Industrial development since Civil War</i> ....	427-448
Labor-saving machinery .....	427
Sale of American machines .....	428-430
The age of machinery .....	430
Reasons for progress .....	430
Agriculture, mills, manufacture .....	430-436
Reasons for industrial supremacy .....	436-438
Railroads, telegraph, etc. ....	439-443
Labor problems .....	444
American Federation of Labor .....	444
Employers' Associations .....	445

***A History of the United States.* Thwaites and Kendall. Hough-  
ton Mifflin Company.**

Introduction of negro slaves .....	60
Indentured servants .....	60
Our country, 1849-1853 .....	270, 271
Economic aspect of negro slavery in the South .....	307-310, 418
Western development .....	404-407
Labor troubles, 1873-1877 .....	407-408
Later labor troubles .....	421, 433, 457, 458
Effect of machinery on work .....	409
Railway and coal strikes and unemploy- ment .....	433, 457-458
Pure Food and Drugs Act .....	461
Supplementary chapter .....	i to ix
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*An Elementary History of Our Country.* Eva March Tappan.  
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Early customs of New England.....	83-88
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Patroon system.....	91-92
Investigation of great corporations.....	246-247
Our country to-day.....	250-252

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First strikes.....	261
Labor movement during Civil War.....	289
Standard Oil Trust.....	327
Organization of labor.....	331
American Federation.....	332
Strike statistics.....	333
Criticisms.....	336
Employers' Associations.....	337

## CHAPTER IX

### SCIENCE

THE major purpose of the work in science for pre-vocational boys is not to turn out scientists capable of doing elaborate scientific work, but to create a rudimentary interest in scientific facts and principles; to call attention to and explain the more obvious and simple phenomena which the boys meet in their daily surroundings; to lead the pupils to see that science means the substitution of real knowledge for mere guess-work, — the development of rational procedure in the place of the antiquated rule of thumb; to give an idea of the important part which the development of scientific knowledge has played in our modern industrial progress; and to give some practice in reasoning and in applying some of the principles of science.

Furthermore, the work in science is so organized as to make a demand on the pupil for more accurate use of English, drawing, and mathematics. His interest in scientific phenomena thus serves as a correlating principle for other school work.

No attempt is made to cover the whole field of general science for the purpose of laying a foundation for future systematic and specialized science work. Rather such facts are chosen for presentation as will appeal to the present interests of the boys or such as seem peculiarly appropriate to the domestic or occupational life of the worker. Neither is the claim made that the facts

suggested here are the only ones or even the best which might be selected. They are merely suggested from a great body of truth from which any teacher may draw with the testimony that they have all been worked out in prevocational classes and found satisfactory. Of course, in presenting the work to the pupils no attempt is made to differentiate and "classify" it as "physics" or "biology." The following is merely given as indicative of the range of science which the course covers: —

**Physics:**

- Elementary mechanics.
- Heat and ventilation.
- Air pressure and pumps.
- Light and sound.

**Chemistry:**

- Air.
- Water.
- Bleaching.
- Foods. Their fuel and nutritive values.
- Drugs and patent medicines.
- Disinfectants and preservatives.

**Biology:**

- Bacteria, useful and harmful.
- Household pests.<sup>1</sup>

Since only a limited amount of time can be devoted to science, and since the purpose of giving it is slightly different from that which is usually urged for high-school science, for example, it is desirable to note the way in which the subject is presented, especially as the laboratory method is not employed. In defense of

<sup>1</sup> The intimate relation between the material suggested in this brief outline and some of the work given under "Physiology and Hygiene," and also under "Civics," is obvious. There is no duplication, but rather a reinforcement.

the method described in the following paragraphs, it may be said that, as only four hours a week are devoted to the subject, a science course would be rather unproductive if divided between laboratory work and classroom instruction. If the time were devoted entirely to laboratory work it is doubtful whether any more would be accomplished. Even if we grant that a few more scientific facts and principles could be learned through laboratory work, the proposed method more than compensates for any loss in this respect by the gain in the pupil's ability to interpret the printed page and to express himself in writing and in drawing. Moreover, the work in the shops provides considerable concrete information of a scientific nature. This makes the demand for laboratory work in science less imperative.

A method which has been found successful is to have the pupils study a general science textbook and other supplementary material, and to make notebooks which, when completed, constitute illustrated textbooks covering almost the entire work given in the subject. Demonstrations are given by the teacher to arouse interest, and to make the work concrete. They are such as can be performed with relatively little apparatus, or at least with such equipment as can be used in an ordinary classroom.

The textbooks are used as reference books and for the purpose of supplementing information given by the teacher during the demonstrations.

Any good textbook on general science may be used, but no book can be relied on as sufficient in itself. The teacher's presentation of the subject and his ability to relate it to the everyday interests of the pupils are the

important factors in the problem. The following text-books have been found to contain satisfactory reference material for prevocational boys: —

*General Science.* Bertha M. Clark. American Book Co. This book formed the basis of much of the science work with the Boy's Industrial Class at the University of Chicago.

*The First Year of Science.* J. C. Hessler. B. J. Sanborn & Co. This contains good material.

Multiple copies of direct questions, based on the text and on the demonstrations, are prepared and each pupil is supplied with a copy. The nature of these questions will be seen from typical illustrations which appear below.

The usual classroom procedure is to begin with the demonstration and to follow this by the reading of the texts and by notebook work guided by the question sheets. When there is no demonstration, the teacher makes an assignment in which he tries to arouse a desire on the part of the pupils to study the text. This is followed by recitation work in which the pupils answer orally the questions on the question sheet. During these oral recitations, the slower pupils have an opportunity to profit from the recitations of the brighter ones, and the difficulties found in the text are cleared up for all. Then the lesson is concluded by notebook work. At this point the character of the question sheets, upon which the notebook work is based, must be described. At first the questions follow the text rather closely and are designed to aid the pupil in mastering the text by focusing his attention on the main thoughts. These questions are so worded as to encourage the pupil to use his own vocabulary rather than the words found in the text. Often they break up the thought of a long and

rather involved sentence into several shorter sentences, thus enabling the pupil to get the meaning of the paragraph which was obscured by the long sentence. Often a question is so worded that its answer involves giving the thought of a whole paragraph. In the early part of the work subordinate questions are placed under these major questions, to assist the pupil in formulating a logical and intelligent answer. A typical question of the latter kind follows. It is based upon a paragraph describing how a Fahrenheit thermometer is graduated. The main question and its subordinates follow:—

**Q.** How is a Fahrenheit thermometer graduated?

**A.** Begin:— A thermometer is graduated in the following way: Then answer the following:—

- (a) How is the  $212^{\circ}$  mark found?
- (b) How is the  $32^{\circ}$  mark found?
- (c) How many degrees are there then between the  $32^{\circ}$  mark and the  $212^{\circ}$  mark?
- (d) Now, if we want each space between the melting point of ice and the boiling point of water to represent two degrees, how many spaces will there be between the  $32^{\circ}$  mark and the  $212^{\circ}$  mark?
- (e) How long, then, will each space be?
- (f) How is this length of space used?

As the pupils improve in their ability to write in better form and reach the point where they can dispense with the subordinate questions, the questions follow the text less closely, become less specific and particular in character, and involve the composition of several related sentences, comprising a paragraph. Toward the end of the year's work, outlines are prepared from which the pupils write shorter or longer compositions on scientific subjects.

Correlation between science and drawing is secured

by so wording a question that it calls for graphic expression in connection with the answer. Mathematics is correlated with science by inserting among the questions problems concerning levers, the inclined plane, pulleys, the differential pulley, the wheel and axle, the screw, the lifting-jack, gears, the bicycle, the geared windlass, etc. These problems involve the use of the processes of addition, multiplication, division, and subtraction of whole numbers and especially of common fractions and decimals.

Practice in reasoning is afforded by inserting questions and exercises which call for the application of principles found in the text. As a rule the answers to questions of this type are not found in the book. The following are samples of the exercises of this kind:—

- (a) If you were a track foreman on a railroad, what directions would you give your gang for laying rails in the winter?
- (b) Why?
- (c) If you were a lineman for a telephone company, how would you string the wires in summer?
- (d) Why?
- (e) How does the boiler-maker take advantage of contraction due to cooling when he rivets boiler plates together?

In some cases, instead of following the above method, the inductive development lesson precedes the study of the text.

While the pupils are studying the texts and answering the questions, the instructor has an opportunity to give individual instruction on points which are not made entirely clear in the demonstration, or which the pupils find obscure in the text. He has also the opportunity of calling attention to mistakes in spelling, sentence struc-

ture, punctuation, and erroneous answers; and to make suggestions in regard to the drawing.

One feature of the instruction which, it is believed, accounts largely for its success, and which should be characteristic of all prevocational work, is that the boys are continually encouraged when they show the least interest, accomplishment, or improvement in their work, and are almost never told that they are doing poor or worthless work. Instead they are shown by example how they can improve, and are given the commendation they deserve.

A word must be said in regard to the motivation of the notebook work. The sources of information are numerous enough to prevent the boys coming to the conclusion that the notebook work could be made unnecessary through the purchase of a textbook. The fact is pointed out that each boy will be compiling a book for himself which will contain information drawn from many sources, the purchase of which would involve considerable expense. Some emphasis is laid on the fact that an attempt will be made to put into the notebooks only the most valuable information, the less valuable and too technical being disregarded. Special emphasis is laid on the fact that the boys have an opportunity to create something which will be of value to them; which they may exhibit with pride to their parents, if they choose to make it creditable; which will be representative of the work of the class and which, in case of a school exhibit, may be shown with considerable credit to themselves and the class.

Several encouraging results have been obtained. First, there is an added interest in reading about scientific truths, and an added ability to learn from the

printed page. Second, there is the acquisition of a few fundamental and useful facts. Third, the work develops an interest in, and to some extent an understanding of, the scientific features of industrial processes many of which can be illustrated in the shopwork. Fourth, there is acquired by the pupil added ability to express himself in writing and drawing. Fifth, the observation of the simple rules of punctuation and capitalization tends to become habitual, and the pupils become more efficient in the fundamental operations of arithmetic. Sixth, the boys frequently acquire a keen zest in writing and re-writing their notebooks, some of which finally reach a point of genuine excellence.

The following illustrative material is planned to show in a concrete way how a given topic is treated, — for example, Heat. Under this general heading are given the following: —

Introduction.  
General Effects of Heat.  
Expansion and Contraction.  
Uses of Expansion and Contraction.  
Methods of Heating Buildings.  
Ventilation.  
Methods of Transmitting Heat.  
Measuring Heat.  
Sources of Heat.

The following questions are selected from a total of ninety-eight covering this general topic, and are illustrative of the principles which have been described above: —

#### HEAT

##### *A. Introduction*

1. Show how heat and fire do damage every day.
2. Tell how heat is used for good purposes.

*B. General Effects of Heat*

1. Expansion and Contraction.
  - a. Tell how you could prove that heat makes water expand.
    - (1) First tell what things you would use.
    - (2) Then tell how you would use them.
  - b. How could you show that heat makes air expand?
  - c. Make up an experiment to show that heat causes expansion.
    - (1) Tell first what materials you would use.
    - (2) Then tell how you would use them.
  - d. How do you think things act when they are cooled?
  - e. What in general may we say is the general effect of heat and cold?
2. Exceptions. Heat does not always cause expansion.
  - a. Does ice, for example, expand or contract when heated?
  - b. How does water act when cooled from 39° Fahrenheit to 32°?
  - c. Are there any metals that contract when heated?

*C. Uses of Expansion and Contraction*

1. How does the blacksmith make use of heat to make iron expand?
2. How does he make use of the contraction due to cooling?
3. How do boiler-makers make use of contraction due to cooling?
4. If you were track foreman on a railroad, what directions would you give for laying the rails in winter? Why?
5. How would you order them to be laid in summer? Why?
6. If you were lineman for a telephone company, how would you string the wires in summer? Why?
7. What causes cement walks to hump and crack in summer?
8. How could this be prevented?

*D. Methods of Heating Buildings*

1. In early times before stoves were invented, how were buildings heated?
2. Explain why smoke goes up the chimney.

3. Why is the open fireplace a healthful way of heating?
4. In what respect was the stove an advance over the fireplace as a means of heating?
5. What part is played by the draft or inlet of a stove?
6. What harm is done by having the damper of the stove wide open all the time?
7. Which is the better way of heating a building; by stoves or by a hot-air furnace? Give two reasons why you think as you do.
8. Explain by means of a diagram how a hot-air furnace works.
9. The hot-water heating system.
  - a. What should you say led to the invention of hot-water heating systems?
  - b. Draw a diagram of a two-room house with a hot-water boiler in the basement and explain how the water circulates.
  - c. How does the hot water in the radiators heat the rooms?
  - d. What does a hot-air furnace do that a hot-water heating system does not do?
  - e. How is ventilation provided for in connection with some hot-water heating systems?
  - f. Why is ventilation necessary?
  - g. In what respects are hot-water systems better than hot-air furnaces?
10. The steam-heating system.
  - a. Draw the cross-section of a two-room house which is heated by steam and explain how the system works.
  - b. What device is used to prevent boilers from blowing up? Show how it works.
  - c. In what respects is heating by steam better than heating by hot water?
  - d. On the other hand, what advantages has hot water over steam heating?
11. Make a short summary on the three ways of heating. Begin: We may summarize on the three ways of heating by saying:
  - a. First, give the advantages of the hot-air furnace.
  - b. Then give its disadvantages.

- c. Give the good points of heating by hot water.
- d. Then tell its weak points.
- e. Close with a statement of which system you prefer.

### *E. Methods of Transmitting Heat*

1. Convection.
  - a. Define convection.
  - b. How does the Gulf Stream illustrate the transference of heat by convection?
  - c. Give two more examples of heat transferred by convection.
2. Conduction.
  - a. Define conduction.
  - b. Give two examples of heating by conduction.
  - c. Define good and poor conduction of heat.
  - d. Show how poor conductors of heat are made use of.
  - e. Show how good conductors are made use of.
3. The fireless cooker.
  - a. Explain the construction of the fireless cooker. (Draw diagram.)
  - b. Upon what principle did its invention depend?
4. Radiation.
  - a. Explain radiation of heat.
5. Describe the processes which take place when rooms are heated by steam.

### *F. Measuring Heat*

1. Show that while the temperature of a body tells how hot the body is, it does not tell the amount of heat in the body.
2. Tell how heat is measured.
  - a. The calorie.
  - b. Calculation of number of calories.
  - c. The British thermal unit.
  - d. Calculation of number of B. T. U.'s.
3. Specific heat.
  - a. Introduction.
  - b. Definition.
  - c. What does the specific heat of a substance tell you?
  - d. Give several examples to make this clear.

## CHAPTER X

### ENGLISH

ALL agree that English is one of the essential subjects for prevocational classes, but there is little uniformity of opinion regarding the content of a course of study or the major and subordinate purposes which should determine the methods of teaching it. It is sometimes contended that so-called "Business English," consisting of business forms and shop correspondence, is of prime importance and should be made the central feature of the course. It is reasoned that these children may have but one or two years more of school work, and since they are backward and "anti-book" there is little or no hope of realizing the results for which English is usually taught. For many reasons this point of view is untenable, and the teacher of English in a prevocational class should be governed by more vital considerations. It should be recalled that we are trying to include in all prevocational work the fundamentals, — the essentials of the traditional school work to the fullest extent possible, and that many of the children gain a new interest in school life and continue for three or four years beyond the compulsory school period. It will be well, therefore, to analyze carefully the purposes dominating the usual school courses in English, and to determine the extent to which such purposes apply in the prevocational classes.

In the first place, it should be recalled that English is the only school subject which is required in each of

the twelve years of the traditional public-school system. With the exception of English, almost any subject given in the prevocational school may be conducted as an initial or introductory course, but not so with English. Here the fact must be recognized that the children come to the work with such prejudices and predilections as have been engendered by seven or eight years of schoolroom practice. So far as accomplishment is concerned, nothing can be taken for granted beyond the merest rudiments, yet it is fatal to conclude that the ordinary primary or elementary methods may be employed. It is probable that prevocational children differ more widely in their ability and training in English than in any other school subject.

As noted above, English is the one required twelve-year course. The makers of English courses have apparently decided just what should be accomplished in each of the twelve years on the supposition that all pupils will complete the twelve grades. Therefore an analysis of the purposes of the full twelve-year course is pertinent as a basis for determining what may be attempted in the prevocational class.

Reduced to their simplest forms these purposes seem to be as follows: —

To secure mere literacy, — the mastery of the fundamental mechanics of reading.

To develop power of expression by means of oral and written language.

To impart knowledge about the structure and form of the language.

To develop an appreciation for good literature.

To give information about English and American authors and their works.

Another purpose which is worthy of special comment is the development of the ability to "handle books," as in research work and in the general use of the library, — to get on familiar and friendly terms with the printed page.

It has generally been assumed, however, that this latter purpose, this ability to handle books, would result naturally and inevitably from the English work, — that it was, in fact, an assured by-product, and that no special attention need be given to its cultivation.

It may now be asked which of these purposes are possible of realization and are peculiarly appropriate for the pupils in question.

We may assume literacy, the mere ability to read, though the "near-illiterate" is a decided problem in prevocational work. The majority of the pupils can read and a small proportion can read excellently.

Assuming literacy, what has been described above as a by-product will be found to be the prime motive for prevocational English. In no other respect is the need of the children so great as for the ability to interpret the printed page as a vital message, and in no other way can their highest and permanent advancement be secured so certainly as by developing such ability.

Technical grammar and history of literature should be excluded from our consideration except as they may be taken up with individual pupils where special interest has been developed.

With the foregoing as a background the purposes of a course in English for a prevocational class may be restated as follows: —

The first purpose is to develop a genuine fondness for books of some kind, and a desire to read as a means of recreation.

The second purpose should be to bring to the pupils some realization of the dependence of the civilized world on books, — not merely literary works, but informational works as well, — and to show them that the ability to handle books will contribute to their own success, the purpose being to induce them to read for information.

A third purpose is the development of the power of oral and written expression, through class discussions, descriptions, and oral reading, the latter by those only who can read well, and by means of transcriptions, and the written exercises required in the other subjects, including some work in spelling.

A fourth purpose is the development of æsthetic appreciation, not of literature merely, but of any worthy and beautiful thing of which literary men and women have written and in which an initial interest has been aroused in the minds of the children. The major purpose is to develop idealism and a love of the beautiful, but care must be taken that the teacher does not substitute his own joy for that of the pupil.

Stated still more briefly, prevocational English should have for its most important purpose the development of the reading habit, and the reading should have for its object recreation, information, and inspiration, with a valuable by-product in greater power of expression. Out of these various statements of purpose must be evolved the content and method of the course.

For obvious reasons it is impossible to outline a course of study in English for prevocational boys with the same definiteness, singleness of purpose, and inclusiveness as is possible in the case of science, civics or history. For that reason the methods which have been found suc-

cessful in accomplishing the several purposes, as enumerated above, will be considered separately and in direct relation to the particular purpose under discussion. It is evident that no single lesson can be carried out without combining two or more of the several purposes. That is to say, it will be impossible to develop reading for entertainment without at the same time increasing the pupil's ability to read for information. A much clearer conception of the methods will be possible, however, if each purpose is examined independently.

It is well to reflect, also, that the individual teacher must be guided in his practice by the conditions of his own school, and that these conditions must determine, to a great extent, which purpose shall be paramount and which shall be secondary and contributory. Where all conditions warrant, it will help materially to divide the class into two or three groups, according to ability in reading, in order that the methods may be more accurately adapted to each individual.

In the following pages are presented suggestions regarding concrete material and typical schoolroom practices, together with a discussion of the principles involved.

As has been pointed out, the near-illiterate is a problem in many prevocational classes. With such children the first weeks are of great importance, and if the initial work is tactfully carried out, the problem ceases to exist and the classification may be eliminated.

Undoubtedly an initial impulse to read may be given in a variety of ways, depending upon the personality and natural interests of the teacher. The following is suggested because it can be carried out by any one willing to do the work incident to collecting the material,

and because it has been found by experiment to appeal to a large majority of the boys.

First, material must be provided which will secure and develop genuine self-activity on the part of the pupil; second, it must be extremely simple and straightforward; and third, it must be conspicuously free from "childishness."

For the above reasons "trade material" has been used. Such material includes manufacturers' catalogues, carefully selected advertisements, and some of the material in trade journals. One magazine, *Popular Mechanics*, is especially valuable. As illustrative of such material the following publications are suggested:

*David Maydole, Hammer Maker.* Published by the David Maydole Hammer Company, Norwich, Chenango County, New York. This is taken directly from Parton's *Captains of Industry*,<sup>1</sup> but it can be had in this form for the asking, and it always appeals to the boys.

*The Story of an Inland Sheet.* Published by the Inland Galvanized Steel Company, office in First National Bank Building, Chicago, Illinois.

*Educational Publications of the International Harvester Company.* These are published by the Agricultural Extension Department of the company and can be secured at slight expense by addressing the department at the Harvester Building, Chicago. Some of the most helpful of these studies are *The Story of Bread*, which correlates well with the history; *Engine Operator's Guide*, which is appropriate for the classes in shop-work; and *Trap the Fly*, which reinforces some of the lessons in hygiene and sanitation.

*Logging by Steam.* Published by the Lidgerwood Manufacturing Company, Fischer Building, Chicago.

*The Illustrated London News.* The only reading matter is that which is found beneath the illustrations. It serves as an illustration of terse, descriptive English and helps in developing good oral expression as well as the reading habit.

<sup>1</sup> Houghton Mifflin Company.

*Popular Mechanics.* This magazine is a universal favorite. It deals with live, current material, has excellent illustrations, and employs simple English and business and shop terms. It stimulates the boys not alone to verbal expression, but suggests construction in materials as well, including experimental work of great variety.

*Captains of Industry.* By Parton. This, in common with all large books, makes slight appeal to the boys under discussion, but where the single chapters are printed in pamphlet form, as in the case of *David Maydole*, mentioned above, they are extremely popular. Where the school operates a printing-shop, separate chapters, which are appropriate for individual pupils or for a particular community, may be reproduced.

In conclusion it may be said that these boys should have frequent opportunity to hear good reading. This will be discussed in another connection, but in passing it should be noted that experience demonstrates that these very boys enjoy to the full, when read by the teacher, such things as Stevenson's *Treasure Island*, John Fox, Jr.'s *The Little Shepherd of Kingdom Come*, and Dickens's *Christmas Carol*.

Reading has long been held in esteem as one of the highest forms of entertainment. It is relatively inexpensive, and books are available to-day almost anywhere in the civilized world. When one reflects on these facts it is with some surprise that he recalls how little attention is given in the average school to the development of reading for enjoyment. It is probably because of the assumption that if the school develops literacy, the enjoyment will naturally and inevitably follow. Unfortunately this assumption has far too little basis in fact. It should be recalled that many of these children come from homes in which books are used but little, in which case their chief contact with reading material has been with school texts. While these are frequently

interesting if read at will and for pleasure, the uses to which they have been put in the classes of which these children were members have given little pleasure and frequently have produced disinclination on the part of some pupils to have anything to do with books of any kind. To be sure, a few of the children are fond of books, but others heartily dislike them. To change this attitude of dislike into one of fondness can be done only by studying the individual tastes and interests of the several children, and by adapting the early reading to these individual tastes.

The well-known librarian, John Cotton Dana, once said that in order to induce a community to read the best books, it was first necessary to provide those which the people wanted and which they could read easily and quickly, and then, gradually, to introduce the works they ought to have. The same is essentially true of the prevocational class. To develop the reading habit with these boys there should be unrestrained access to a large and varied assortment of books and magazines, some of which will certainly appeal to the boys, and a liberal amount of school time should be devoted to the silent perusal of them as a part of the regular work in English. The familiar school practice of permitting the more rapid workers to "read to themselves" on the completion of a given task ought to serve as an object lesson of what should be provided for all prevocational pupils with great frequency and regularity.

Such reading, of course, should be supervised and sympathetically directed. Always holding that the "joy" of the pupil is to be the first consideration at this point, the material may be improved as rapidly and as markedly as is consistent with the major purpose.

In this way talks about books, in the course of personal conferences, will become a feature of the "required work," and will be conducted in the time assigned to English. If it should be contended that such practice would be expensive in time and meager in results, the answer must be made that it is better to spend many hours this way, with nothing but a "love of reading" as a result, than to spend the same amount of time in formal English work with little resulting power to use books and no inclination to consult them either for pleasure or profit. We have been led to feel that with these boys, at least, this reading for pleasure can be carried over into the field of research reading and therefore that the love of reading may be the "beginning of wisdom." It can be accomplished with certainty when the purpose to do so is clearly held and wisely followed. Three elements are absolutely necessary, however, varied reading material, sympathy, and school time.

To bring the discussion to a concrete basis it is necessary to visualize the personal element in the situation. We must picture the whole class of boys, not forgetting the type, sitting in a schoolroom for an hour, each reading silently from a different publication and upon a different subject. This is taking place in regular school time and as regular school work, yet it is varied, individual, and very largely self-directed. Occasionally a boy leaves his chair, goes to the bookcase, deposits the book he has been reading, and, after examining three or four, selects a new book or magazine and goes back to his place. It is surprising to find that there is so little waste of time, so little confusion, such eager beginning and such reluctant ending of the hour.

For the successful carrying-out of such a plan certain

features are necessary. In the first place, there must be a variety of material, variety as to subject-matter and as to the kind of publications. There should be books, magazines, and daily papers. In addition to the trade material mentioned above the following list is given. It is not intended to be all-inclusive, but is suggestive of the variety and style of reading material used in some prevocational classes.

PARTIAL LIST OF READING MATERIAL USED  
SHOWING VARIETY

*Books*

<i>Machine Shop Primer.</i>	Colvin and Stanley.
<i>Four Great American Inventors.</i>	Perry.
<i>Hygiene for the Worker.</i>	Tolman.
<i>How it is Made.</i>	Williams.
<i>Romance of Mining.</i>	Williams.
<i>Woodworking for Beginners.</i>	Wheeler.
<i>Stories of Useful Inventions.</i>	Forman.
<i>Harper's Electricity for Boys.</i>	Adams.
<i>With the Men Who Do Things.</i>	Bond.
<i>Home Experiments in Science.</i>	Sloane.
<i>The Boy Mechanic.</i>	Windsor.
<i>Letters and Lettering.</i>	Brown, F. C.
<i>The Land We Live In.</i>	Price.
<i>The Boy Craftsman.</i>	Hall.
<i>The Boys' Book of Model Aeroplanes.</i>	Collins.
<i>Wireless Telegraphy.</i>	Fortescue.
<i>All About Ships.</i>	Darling.
<i>Things a Boy Should Know About Wireless.</i>	St. John
<i>Stories of Inventors.</i>	Doubleday.
<i>Heroes of Progress.</i>	Morris.
<i>American Inventions and Inventors.</i>	Mowry and Mowry.
<i>Historic Boyhoods.</i>	Holland.
<i>Stories of Industry.</i>	Am. Book Co.
<i>Industries of To-day.</i>	Ginn and Co.
<i>Geographical Readers.</i>	Carpenter.
<i>How the World is Housed.</i>	Carpenter.

- How the World is Fed.*  
*How the World is Clothed.*  
*Great American Industries.*  
*Story of Iron and Steel.*  
*The Community and the Citizen.*  
*Handwork in Wood.*  
*How to Install Electric Bells.*  
*Story of My Life.*  
*Winning Their Way.*  
*Heroes of Every Day Life.*  
*Some Successful Americans.*  
*Men of Business.*  
*Lives of Poor Boys Who Became Famous.*  
*The Young Forester.*  
*Oxford Industrial Readers.*  
     *A Day with the Leather Workers.*  
     *A Day in an Iron Mine.*  
     *A Visit to a Cotton Mill.*  
     *A Day in a Ship Yard.*  
     *A Visit to a Coal Mine.*  
     *A Visit to a Woolen Mill.*  
*Treasure Island.*  
*The Little Shepherd of Kingdom Come.*  
*Wild Animals I have Known.*  
*Boys of Old Monmouth.*  
*The Minute Boys of New York.*  
*Left Behind, or Ten Days a Newsboy.*  
*The Boy Sailors of 1812.*  
*Wolf, the Storm Leader.*  
*Captain of the Crew.*  
*Call of the Wild.*  
*Bob, the Son of Battle.*  
*Stories for Boys.*  
*Adventures Afloat and Ashore.*  
*The Cruise of the Ghost.*  
*The Life Savers.*  
*A New Robinson Crusoe.*  
*Lost in the Jungle.*  
*Stories from the Arabian Nights.*
- Carpenter.  
 Carpenter.  
 Rocheleau.  
 Smith.  
 Dunn.  
 Noyes.  
 Schneider.  
 Keller.  
 Faris.  
 Coe.  
 Towle.  
 Stoddard.  
 Bolton.  
 Grey.  
 Cooke.  
  
 Stevenson.  
 John Fox, Jr.  
 Seaton.  
 Tomlinson.  
 Otis.  
 Otis.  
 Tomlinson.  
 Caldwell.  
 Barbour.  
 London.  
 Olivant.  
 Davis.  
 Birdsall.  
 Allen.  
 Otis.  
 Alden.  
 Chaillu.  
 Eliot.

Also books by Gulick and by Ritchie referred to on page 91.

*Magazines*

*Popular Mechanics.*  
*Illustrated London News.*  
*Harper's Weekly.*  
*Youth's Companion.*  
*The Country Gentleman.*  
*Geographical Magazine.*  
*Child Labor Bulletins.*

*Bulletin*, August, 1913:—

1. *Mr. Coal's Story.*
2. *The Story of My Cotton Dress.*
3. *The Story of a Medicine Bottle.*

*Bulletin*, August, 1914:—

*Little Comrades Who Toil.*

*Trade Material*

*The Saw in History.* Henry Disston and Sons, Philadelphia, Pennsylvania.

*The Little Red School House.* Jos. Dixon Crucible Company, Jersey City.

Apprenticeship Bulletins. Boston School of Printing.

Winnipeg Business Men's Talks.

Milk Bulletin. Chicago Medical Society Milk Commission.

Bulletin on Food (no. 21). Illinois State Food Commission.

*Our Tubercular Children* (vol. 1, no. 10). Children's National Tuberculosis Society, 35 South Dearborn Street, Chicago, Illinois.

Educational Publications on the Care of the Teeth. Colgate & Co., New York.

*How to Run a Lathe.* South Bend Lathe Works, South Bend, Indiana.

*The Forging of an Auger Bit.* Greenlee Bros. & Co., Rockford, Illinois.

Publications of National Safety Council, Chicago, Illinois.

*Health and Safety.* Brown & Sharpe Manufacturing Company, Providence, Rhode Island.

*The Employee and Accident Prevention.* The Travelers Insurance Company.

*Foremen and Accident Insurance.* The Travelers Insurance Company.

Publications on Health and Hygiene. Metropolitan Life Insurance Company.

File Philosophy. Nicholson File Company.

Electrician and Mechanic. Sampson Publishing Company.

Second in importance only to the variety of reading matter is its accessibility. The usual plan of supplying "supplementary readers" from the principal's office, one for each boy, and all alike, will not serve here. Neither will it do to try to anticipate the needs of the hour by having the pupils secure their reading material from the library in advance. This will come in time, and rapidly, but at the outset the books must be ready at hand in the room. Additions or substitutions should be made from time to time.<sup>1</sup>

The method of distributing the books affords opportunity for still further vitalizing the work. It should include the freedom of selection, the right of conference

<sup>1</sup> The following list of prose selections, taken from *The Riverside Readers*, serves to show how a set of "Readers" may be indexed by the boys themselves for the peculiar interest and convenience of the prevocational class.

*Riverside Readers* — James H. Van Sickle and Wilhelmina Seegmiller (Houghton Mifflin Company).

<i>Selection</i>	<i>Reader</i>	<i>Page</i>
Horace Greeley, Journalist. James Parton.....	6th	63
David Maydole, Hammer Maker. James Parton.....	7th	65
In the Factory. Henry Clemmons Pearson.....	7th	74
(Emphasizes importance of education.)		
The Colonists. John Aikin and Anna L. Barbauld.....	7th	59
(Relative value to the community of the worker and the "gentleman.")		
The History of Two Boys. H. Irving Hancock.....	7th	80
(Illustrates two types of character in business life.)		
Readers and Reading. Henry van Dyke.....	8th	35

with the teacher, and the development of a simple library system.

Too much importance cannot be attached to the liberty given the pupils to select their own reading material. Of course, through conferences with the teacher, the reading is guided, directed, and supervised, but the pupil still selects his books from day to day. By this very process he is enabled to examine, and so become somewhat acquainted with, a much larger number of books than under any other plan. He is led to appreciate the great variety of uses to which the printed page is put, and so learns to discriminate in his reading. If the boy learns how to read a newspaper he has acquired that which will be of considerable value to him throughout his life.

An excellent device is to have the class work up a card catalogue with notations on each card by the different pupils who have read the book. In addition to this, a slip fastened in the book may contain the names of the pupils who have read it, together with some brief comment by each reader. Also, from time to time, especially after the course is well under way, there may be brief reviews of certain publications, presented either orally or in writing. By means of these reviews and through personal conferences will be found ample opportunity of securing as much reaction on the part of the children as should be required in this phase of the course in English. It must be reiterated that enjoyment of the reading process is of infinitely greater importance than any other feature in the peculiar problem with which we are dealing. Where the prevocational work is likely to cover two or more years, we believe that it is profitable to devote the first third of the time almost exclusively

to this process of establishing friendly relations with books.<sup>1</sup>

It is a matter of easy transition from reading merely for entertainment to reading for information. The daily hour set aside for silent reading may readily develop into a period of supervised study. The first essential of such a transition is coöperation between the teacher of English and the teachers of the other subjects, if such subjects are taught departmentally.

This coöperation with the other teachers makes a peculiar demand on the teacher of English in a pre-vocational class. He may be permitted to be a specialist so far as the reading for entertainment and the reading for æsthetic appreciation are concerned, and even in the realm of written and oral expression he may be allowed to do some work in English "for the sake of English," but he must acquire an interest in the subject-matter of all the other studies. In time he should become conversant with the more important literature used in the courses in history, civics, science, hygiene, and shop-work. He cannot say, "It is my business to know and to teach English." It must be his recognized duty to

<sup>1</sup> The following table shows the increase in the number of books read by the Industrial Class at the University of Chicago where this method was employed:—

*Table showing number of books read by a class of about twenty boys*

<i>October</i>	<i>November</i>	<i>December</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>
10	22	24	54	74	59	40

NOTE:—December and March were shortened by the Christmas holidays and the spring recess. In April the time allowed for reading was shortened by two fifths.

teach the pupils how to use English in any department of their school work.

Where the same teacher is teaching history and English, for example, there are times when it would be difficult to say whether certain work was being done as history or as English. Because of the teacher's common interest, the two subjects have been correlated naturally. The same kind of correlation should be sought when the work is done by different teachers. Where the reading material has been listed, as in the case of hygiene and history in this series, such coöperation is a relatively simple matter, provided the entire work of the class has been coördinated by one person and the several teachers understand the plan and the principles involved.

As examples of such correlation the following concrete illustrations are given.

The teacher of history has discussed with the class the subject of the evolution of tools from the crude forms as used by primitive man to the modern complicated machine tools. The hammer has been chosen as an example beginning with the crude stone, bound with thongs to the end of a stick, and ending with the steam and pneumatic hammers. The time which can be appropriately devoted to this phase of history has been consumed, but the teacher of English may well utilize the interest which the boys now have in this subject by giving them such reading matter as *The Saw in History*.

Or let us suppose that the teacher of physiology has told briefly, in a lesson on anatomy, the story of Atlas in connection with the mention of the second vertebra, or has referred, in a discussion on the muscles, to the tendon of Achilles. Experience has shown that even

this slight introduction has served amply to open the way for the teacher of English to present Hawthorne's charming tales from the Greek myths or to lead delightful excursions into the classic realm of the heroes of Greece and Troy.

The shop also suggests subjects for work in English. While any intensive study of the larger industries belongs in the main to the department of history, still there are many related social and industrial questions of which the English department must take account. By coöperating with the teachers of shopwork and history, the English department will find ample material relating to such subjects, for example, as the production of iron, steel, coal, and lumber.

In addition to utilizing the reading material in other subjects for the purpose of teaching the pupils how to read for information, some special talks may be given to show the children something of the utility of books in general, and of the extent to which they enter into the practical work of the civilized world. Things that are matters of such common knowledge to us as to seem obvious are frequently overlooked by them. We comprehend, for example, that books serve a great variety of purposes and that there are few problems presented by life to the solution of which the printed page may not have something to contribute. How may the pupils be led to a similar appreciation?

Children are almost always interested in hearing about the history of iron and steel, and of the workings of the great factories in which such material is made into products for the market. Such recitals as these are thought to be especially appropriate for prevocational classes, yet it is an open question whether they

are more appropriate or more interesting or more valuable to the average prevocational child than would be the history of books and a description of the workings of some large public library. The library is, in fact, a huge machine, and the librarian and his assistants know how to operate it. To them the library is not the awe-inspiring and incomprehensible thing that it is to the average child. The children would not feel so helpless in the presence of thousands of volumes if they knew something of the principles of classification and cataloguing. They should learn how an assistant librarian can pick out, from the mass of reading, the little piece of information for which the reader happens to be searching.

By merely naming, or by informally discussing, just a few of the classifications, the teacher can open new worlds to some of the children. Take, for example, the following as illustrative and think what any teacher may tell the children that will prove both interesting and instructive and that may result in exciting a curiosity about books: —

*Classification*

Fiction.	Travel.	Civics.	Engineering.
Biography.	Art.	Politics	Mechanics.
History.	The drama.	Science.	Encyclopædias.

A few facts about some of the world's great libraries; the knowledge that ancient libraries were only for the great and powerful and could be used only by great scholars; a brief statement of the development of the American plan of free, municipal, circulating public libraries, — these and other similar topics are quite as interesting and quite as appropriate for industrial

classes as the story of iron and steel, and it is believed that some acquaintance with such facts will convince the children that books are indeed useful and valuable things.

It will also be of interest and somewhat of a surprise to many children to learn that some manufacturing concerns maintain libraries of their own and employ a librarian. At first thought there may seem to be little connection between a factory and a library, but a little reflection will show the boys that modern industry makes so many demands on science, art, and mechanics, and on other related or contributing industries, that it is desirable to have all the educational material possible ready at hand for both employer and employees.

Any teacher who has the right point of view can find countless opportunities for bringing to the attention of the children the great utility of books.

While the development of verbal expression, both oral and written, is a legitimate purpose of prevocational English, it should be admitted that this is of far less importance than the quickening of the pupil's powers of acquisition. It should also be said that, of the two, oral expression is of far more value to these boys than written composition.

While of secondary importance, the development of ready, accurate verbal expression should not be overlooked entirely. Some instruction, therefore, must be given in penmanship, composition, and spelling, and possibly in reading aloud for intonation and expression, but the prevocational teacher must not fail to see this work in its proper perspective. There is nothing more disheartening than to see a teacher of prevocational boys proceeding in his instruction with the same undue

emphasis on the unessentials that resulted so disastrously with these very children while they were in the grades. Undoubtedly it would be better to eliminate this whole phase of English, for these boys, than to over-emphasize it at the expense of the reading for entertainment, for information, and for inspiration.

Little formal instruction should be given in penmanship in the prevocational class. The personal criticism of all written work, together with occasional study of excellent examples of penmanship, should result in any needed improvement in the formation of letters.

An incentive for a little exceptionally good or careful writing may be provided in various ways. One such expedient is to have each boy keep a "Rule Book," in which is written, from time to time, directions, suggestions for work, or other matters which the teacher wishes to have in the boys' hands for immediate reference; such, for example, as rules for self-management in school, and rules for sanitation and hygiene in school or home. Some of the notebook work, the copying of poems and of selected prose extracts, and the work on the card index previously mentioned may be cited as means of securing improvement in penmanship.

The time available is too limited to permit of developing spelling as a subject. Undoubtedly individual attention should be given to desperately bad cases in order to discover if there is some special cause for this condition which can be corrected readily. Such cases have been discovered and materially improved. Here, also, the most appropriate method is that of personal criticism and suggestion. Spelling lessons should preferably be informal and should rarely include spelling aloud. Word study which can be made picturesque or

dramatic, and which can be introduced informally, will serve the double purpose of improving the spelling and of providing another opportunity for the development of oral expression. As an example of words which may be studied in this way the following are suggested: —

<i>good-by</i> —	Contraction of "God be with you."
<i>dahlia</i> —	From name of Swedish botanist, Dahl.
<i>macadamize</i> —	From name of Scottish engineer, John Louden MacAdam.
<i>boycott</i> —	From name of first victim of that system.
<i>derrick</i> —	From name of London hangman of seventeenth century.
<i>thimble</i> —	From Anglo-Saxon, <i>thuma</i> , "thumb."
<i>alphabet</i> —	From Greek, <i>alpha</i> and <i>beta</i> .
<i>school</i> —	From Greek, <i>scholē</i> , "leisure."
<i>sarcasm</i> —	From Greek, <i>sarx</i> , "flesh."
<i>nausea</i> —	From Greek, <i>naus</i> , "ship."
<i>aviation</i> —	From Latin, <i>avis</i> , "bird."
<i>dexterous</i> —	From Latin, <i>dexter</i> , "right."
<i>sinister</i> —	From Latin, <i>sinister</i> , "left," as opposed to <i>dexter</i> , "right"; whence the meaning "ill-omened," "bad."
<i>tantalize</i> —	From the Latin myth of Tantalus.
<i>rival</i> —	From Latin, <i>rivales</i> , "near neighbors"; <i>rivus</i> , "river"; and so the struggles among people for habitation on river banks developed the word "rival."
<i>tariff</i> —	From the Spanish promontory, Tarifa, once inhabited by Moors.

Other expedients found useful are: —

Dictation with immediate correction of misspelled words in class, corrections being made by the boys themselves. They may report on their improvement from day to day, not on the percentage of failures.

Study of list of words collected from shop and other classes by the boys.

Occasional reference to published lists, such, for example, as that compiled for the vocational class of Swift and Company, Chicago, familiarly known as the "Swift Speller."

Dictionary work, conducted in school time as a class exercise, is valuable.

It is difficult to conceive of any good reason why oral reading should ever be given as a class exercise in a prevocational school, but the practice is so common that some consideration must be given to the question.

Experience would go to show that it is worse than a waste of time to have the members of a class sit and listen to desperately bad readers struggling painfully through sentence after sentence, the import of which is already a matter of common class knowledge, since the book is under the eyes of all. If the oral reading were of excellent quality, something might be learned by imitation, but as it is the listener acquires little or nothing but distaste for the whole proceeding, and the reader is in even a worse plight, since he is keenly conscious of his failure to entertain or enlighten either himself or his listeners. Whatever may be the teacher's purpose for such practice, it is impossible to discover any actual accomplishment which can be called worthy. Oral reading may serve an excellent purpose in prevocational education, but that phase of English will be discussed in another place.

Technical grammar has no place in prevocational work excepting in its most elementary form. The ability to recognize in a sentence a noun, a verb, an adjective, or an adverb, the subject or the predicate, is about as far as grammar should be carried as a subject. Even this attempt at sentence analysis should be discontinued

unless there is unmistakable evidence that the interest is genuine, and that the work actually contributes to the pupils' ability to express themselves more clearly and concisely.

It must not be assumed, because prevocational pupils are backward in school, that they are lacking in the capacity for æsthetic enjoyment. There is frequently a hunger in the hearts of these children which none of the so-called practical work can satisfy. English offers an opportunity to minister to this need, and perhaps oral reading will afford the best approach. This reading, however, should be done mainly by the teacher or by excellent readers drawn from other departments of the school.

The ability to listen with pleasure to good reading is almost universal. Most adults have vivid recollections of things read to them in childhood, frequently with no intention that they should be retained, but which have been of lasting inspiration and benefit to them. Ordinarily the teacher, under the stress of required work, does not feel at liberty to take the time for giving to the children a series of these pleasurable recollections. In the prevocational class in English this should be an important part of the regular program.

In addition to listening to oral reading, the pupils should read for themselves, should copy in their notebooks, and occasionally should commit to memory, examples of good literature. While some of the longer literary works may come within the capacity of an occasional pupil, for the large majority short extracts and adaptations from these works, and quotations from both prose and poetry, will be found preferable. These may well be selected to engender a respect for labor. It can-

not be denied that literature has sung mainly the praises of the great and powerful, but tributes to the humbler workers are not wanting. The teacher who searches sympathetically will find ample material. As illustrative of this material and as indicative of variety, the following quotations are selected from a mass of such examples employed in prevocational classes:—

No man is born into the world whose work  
Is not born with him; there is always work,  
And tools to work withal, for those who will,  
And blessed are the horny hands of toil!  
The busy world shoves angrily aside  
The man who stands with arms akimbo set,  
Until occasion tells him what to do:  
And he who waits to have his tasks mapped out  
Shall die and leave his errand unfulfilled.     *Lowell.*

#### *All Work*

All true work is sacred; for in all true work, were it but true hand-labor, there is something of divineness. Labor, wide as the earth, has its summit in heaven.     *Carlyle.*

#### *The Prize of Life*

Genial manners are good, and power of accommodation to any circumstance, but the high prize of life, the crowning fortune of a man is to be with a bias to some pursuit, which finds him in employment and happiness—whether it be to make baskets, or broadswords, or canals, or statutes, or songs.     *Emerson.*

#### *The Worker*

The world is at its best. I feel  
A triumph in the work I do.  
With every turning of the wheel  
I add a little that is new.

The masses shapeless through the past,  
I, even I, give shape. I bring  
From silent uselessness at last  
The pleasing useful thing.

All that has been since the first light  
Shot out across the gulfs of space,  
Was that my crowning labor might  
Put something in its ordered place.  
The sound the toiling thousands make  
Is earth's sublimest symphony,  
And I, a worker, proudly take  
The part assigned to me.

*Kiser.*

*Music of Labor*

The banging of the hammer,  
The whirling of the plane,  
The crashing of the busy saw,  
The creaking of the crane,  
The ringing of the anvil,  
The grating of the drill,  
The clattering of the turning lathe,  
The whirling of the mill,  
The buzzing of the spindle,  
The rattling of the loom,  
The puffing of the engine,  
The fan's continual boom,  
The clipping of the tailor's shears,  
The driving of the awl —  
These sounds of honest industry  
I love — I love them all.

*Anonymous.*

*Always*

Honest labor bears a lovely face.

*Dekker.*

*A Man's Work*

In the morning when thou art sluggish to rouse thee, let  
this thought be present: "I am rising to a man's work."

*Marcus Aurelius.*

Thus it will be seen that the work in English, even in prevocational classes, offers wide opportunity for the presentation of much that is inspirational. It will be a sorry day for education if the schools admit that inspirational literature is mainly for the few and that the only training needed by the workers is in the so-called practical phases of industrial education. Rather should such literature be brought to light as will help to raise humble work out of its commonly sordid and unpoetic relations and touch it with the magic of idealism.

## CHAPTER XI

### MATHEMATICS

It is obvious that mathematics must be included in the subjects of instruction for prevocational pupils and that the work must be selected with due reference to their peculiar needs. With few exceptions, such pupils, when they enter the prevocational class, are decidedly deficient in arithmetic, being far behind children of the same age who have maintained the normal rate of progress in the schools. They are remarkably slow and extremely inaccurate in all mathematical calculations; they lack the ability to understand problem statement, analysis, and solution; they are uninterested in the subject and are unconvinced of its importance. To make good these deficiencies and to change these attitudes, the course planned for prevocational pupils must provide some real incentive to drill in the fundamental operations, and it must give convincing proof of the utility of the subject by affording ample opportunity for the pupils to apply their mathematical knowledge. The subject will be discussed, therefore, under these two general subdivisions, drill and utility. It must be obvious that these are not absolutely distinct phases of the problem of mathematics, and that in practice they will react upon each other and will progress together, but they can be discussed more clearly if considered separately.

The pupil who makes the normal progress in school

has had the necessary drill in the fundamental operations before reaching the difficult and critical age of adolescence. To demand drill of the prevocational pupil and to expect unquestioning and unresenting acquiescence to it is to invite still further failure. Yet it is fruitless to attempt mathematical instruction without such drill. A device which has been found measurably successful in securing this necessary drill in a prevocational class is here described.

Without special reference to arithmetic the fact is scientifically developed that practice increases efficiency. The plan is then explained to the pupils whereby each one can prove the truth of this fact by his own experience extending over a few weeks and consuming not more than five minutes a day. It is shown that each boy can make this investigation by testing himself and can determine his relative increase in efficiency by comparing himself with others.

Drill tables are prepared involving the addition of fractions. It is preferable to drill in addition of fractions rather than whole numbers for several reasons. First, addition of whole numbers seems too simple to a boy of this age, even though he is extremely deficient in it, in both speed and accuracy; second, the addition of long columns does not provide sufficient variety to excite active interest; and third, it is easier to convince boys that they do not know how to handle fractions than it is to prove to them that they cannot add whole numbers, and it is more easily shown that this deficiency is a handicap in their work.

About twenty problems, involving fractions, are presented as a class exercise in arithmetic. The results convince the pupils that some special attention should

be given to addition, subtraction, multiplication, and division of fractions. These problems are such as the boy meets in drawing to scale, involving the division of ascertained dimensions by one half, one fourth, or one eighth; or in figuring the over-all length of a piece of work from the intermediate dimensions; or in making out simple bills of stock for various shop jobs.

At first the entire arithmetic period is devoted to the explanation of principles and demonstration of their application, but after a few days the work on drill tables is taken up at the beginning of each lesson for the first five minutes only. Examples of tables actually used in a prevocational class follow (pp. 176-179).

Five or six tables for each process will be enough to provide such variety of arrangement that answers cannot be memorized. The second table on subtraction illustrates this variety. If the order in which the tables are given out day after day is varied, this number of tables will provide sufficient work for five-minute exercise periods through several months.

The number of problems on a sheet should be a matter of experimentation, as many being given as a class will work out with reasonable energy. The work should not extend over a period long enough to reduce the intensity with which the pupils apply themselves.

The manner of using the table is obvious, but a word may be added regarding the plan of checking up and utilizing the results from day to day.

Accuracy and speed are both considered. To arrive at a significant numerical statement of the result, the number of correct answers is divided by the number of seconds allowed, and, to produce a whole number, the

*To the class:* Make as many of the ADDITIONS as you can in the time allowed. Please stop your work as soon as the teacher calls "Time up."

$\frac{1}{2} + \frac{1}{4} =$	$\frac{1}{2} + \frac{1}{8} =$	$\frac{1}{2} + \frac{1}{16} =$	$\frac{1}{2} + \frac{1}{32} =$	$\frac{1}{2} + \frac{1}{64} =$
$\frac{1}{4} + \frac{3}{8} =$	$\frac{1}{4} + \frac{5}{16} =$	$\frac{1}{4} + \frac{7}{32} =$	$\frac{1}{4} + \frac{9}{64} =$	$\frac{1}{8} + \frac{7}{16} =$
$\frac{3}{4} + \frac{1}{16} =$	$\frac{3}{4} + \frac{5}{32} =$	$\frac{3}{4} + \frac{3}{64} =$	$\frac{3}{8} + \frac{5}{16} =$	$\frac{5}{8} + \frac{7}{64} =$
$\frac{7}{16} + \frac{17}{32} =$	$\frac{9}{16} + \frac{9}{64} =$	$\frac{5}{8} + \frac{11}{32} =$	$\frac{3}{4} + \frac{9}{32} =$	$\frac{3}{16} + \frac{5}{32} =$
$\frac{1}{2} + \frac{1}{8} =$	$\frac{1}{4} + \frac{1}{5} =$	$\frac{1}{5} + \frac{1}{6} =$	$\frac{1}{4} + \frac{1}{9} =$	$\frac{1}{8} + \frac{1}{4} =$
$\frac{3}{8} + \frac{1}{8} =$	$\frac{3}{5} + \frac{2}{9} =$	$\frac{3}{7} + \frac{4}{7} =$	$\frac{3}{4} + \frac{2}{9} =$	$\frac{3}{8} + \frac{3}{11} =$
$\frac{3}{4} + \frac{1}{6} =$	$\frac{2}{9} + \frac{4}{6} =$	$\frac{3}{8} + \frac{3}{6} =$	$\frac{5}{12} + \frac{4}{9} =$	$\frac{5}{12} + \frac{3}{8} =$

Pupil's Name .....

Date .....

Time .....

No. Correct .....

*To the class:* Make as many of the SUBTRACTIONS as you can in the time allowed. Please stop your work as soon as the teacher calls "Time up."

$\frac{1}{2} - \frac{1}{4} =$	$\frac{1}{2} - \frac{1}{8} =$	$\frac{1}{2} - \frac{1}{16} =$	$\frac{1}{2} - \frac{1}{32} =$	$\frac{1}{2} - \frac{1}{64} =$
$\frac{3}{8} - \frac{1}{4} =$	$\frac{5}{16} - \frac{1}{4} =$	$\frac{1}{4} - \frac{7}{32} =$	$\frac{19}{64} - \frac{1}{4} =$	$\frac{7}{16} - \frac{1}{8} =$
$\frac{3}{4} - \frac{1}{16} =$	$\frac{3}{4} - \frac{5}{32} =$	$\frac{3}{4} - \frac{3}{64} =$	$\frac{3}{8} - \frac{5}{16} =$	$\frac{5}{8} - \frac{7}{64} =$
$\frac{17}{32} - \frac{7}{16} =$	$\frac{9}{16} - \frac{9}{64} =$	$\frac{5}{8} - \frac{11}{32} =$	$\frac{3}{4} - \frac{9}{32} =$	$\frac{3}{16} - \frac{5}{32} =$
$\frac{1}{2} - \frac{1}{8} =$	$\frac{1}{4} - \frac{1}{5} =$	$\frac{1}{5} - \frac{1}{6} =$	$\frac{1}{4} - \frac{1}{9} =$	$\frac{1}{8} - \frac{1}{4} =$
$\frac{3}{8} - \frac{1}{8} =$	$\frac{3}{5} - \frac{3}{9} =$	$\frac{4}{7} - \frac{3}{7} =$	$\frac{3}{4} - \frac{2}{9} =$	$\frac{3}{8} - \frac{3}{11} =$
$\frac{3}{4} - \frac{1}{6} =$	$\frac{4}{6} - \frac{2}{9} =$	$\frac{3}{6} - \frac{3}{8} =$	$\frac{4}{9} - \frac{5}{12} =$	$\frac{5}{12} - \frac{3}{8} =$

Pupil's Name.....

Date .....

Time .....

No. Correct .....

*To the class:* Make as many of the SUBTRACTIONS as you can in the time allowed. Reduce answers to lowest terms. Please stop your work as soon as the teacher calls "Time up."

$\frac{1}{2} - \frac{1}{4} =$	$\frac{3}{4} - \frac{1}{16} =$	$\frac{1}{5} - \frac{1}{6} =$	$\frac{19}{64} - \frac{1}{4} =$	$\frac{1}{8} - \frac{1}{4} =$
$\frac{1}{2} - \frac{1}{64} =$	$\frac{8}{8} - \frac{8}{11} =$	$\frac{7}{16} - \frac{1}{8} =$	$\frac{3}{4} - \frac{5}{82} =$	$\frac{1}{2} - \frac{1}{82} =$
$\frac{5}{12} - \frac{3}{8} =$	$\frac{1}{2} - \frac{3}{8} =$	$\frac{1}{4} - \frac{7}{82} =$	$\frac{3}{8} - \frac{1}{4} =$	$\frac{19}{32} - \frac{7}{16} =$
$\frac{5}{16} - \frac{1}{4} =$	$\frac{1}{2} - \frac{1}{16} =$	$\frac{3}{8} - \frac{1}{8} =$	$\frac{1}{2} - \frac{1}{8} =$	$\frac{3}{8} - \frac{5}{16} =$
$\frac{3}{4} - \frac{1}{6} =$	$\frac{4}{7} - \frac{3}{7} =$	$\frac{1}{4} - \frac{1}{9} =$	$\frac{9}{16} - \frac{9}{64} =$	$\frac{3}{4} - \frac{2}{9} =$
$\frac{4}{6} - \frac{2}{9} =$	$\frac{3}{4} - \frac{3}{64} =$	$\frac{5}{8} - \frac{7}{64} =$	$\frac{4}{9} - \frac{5}{12} =$	$\frac{3}{4} - \frac{9}{82} =$
$\frac{5}{8} - \frac{11}{82} =$	$\frac{1}{4} - \frac{1}{5} =$	$\frac{3}{16} - \frac{5}{82} =$	$\frac{3}{6} - \frac{3}{8} =$	$\frac{3}{5} - \frac{2}{9} =$

Pupil's Name .....

Date .....

Time .....

No. Correct .....

*To the class:* Make as many of the DIVISIONS as you can in the time allowed. Reduce answers to lowest terms. Reduce improper fractions to mixed numbers. Please stop your work as soon as the teacher calls "Time up."

$\frac{1}{2} \div \frac{1}{4} =$	$\frac{3}{4} \div \frac{1}{16} =$	$\frac{1}{5} \div \frac{1}{6} =$	$\frac{1}{5} \div \frac{1}{4} =$	$\frac{9}{64} \div \frac{9}{16} =$
$\frac{3}{4} \div \frac{2}{9} =$	$\frac{3}{8} \div \frac{8}{11} =$	$\frac{1}{2} \div \frac{1}{64} =$	$\frac{5}{12} \div \frac{3}{8} =$	$\frac{1}{2} \div \frac{1}{32} =$
$\frac{17}{32} \div \frac{7}{16} =$	$\frac{7}{32} \div \frac{1}{4} =$	$\frac{19}{64} \div \frac{1}{4} =$	$\frac{1}{8} \div \frac{1}{4} =$	$\frac{1}{8} \div \frac{1}{2} =$
$\frac{1}{2} \div \frac{1}{8} =$	$\frac{8}{4} \div \frac{8}{64} =$	$\frac{7}{8} \div \frac{7}{32} =$	$\frac{3}{8} \div \frac{1}{8} =$	$\frac{3}{4} \div \frac{9}{32} =$
$\frac{3}{5} \div \frac{8}{4} =$	$\frac{11}{16} \div 3 =$	$\frac{3}{5} \div \frac{2}{9} =$	$\frac{9}{16} \div \frac{3}{64} =$	$\frac{9}{16} \div \frac{9}{64} =$
$\frac{3}{7} \div 2 =$	$\frac{4}{6} \div \frac{2}{9} =$	$\frac{21}{32} \div \frac{13}{16} =$	$\frac{3}{5} \div \frac{3}{20} =$	$\frac{7}{8} \div 4 =$
$\frac{4}{7} \div \frac{2}{7} =$	$\frac{5}{48} \div \frac{3}{8} =$	$\frac{1}{4} \div \frac{1}{9} =$	$\frac{7}{8} \div \frac{7}{12} =$	$\frac{4}{7} \div \frac{3}{7} =$

Pupil's Name .....

Date .....

Time .....

No. Correct .....

quotient is multiplied by 100. Each boy notes from day to day what his improvement, if any, actually is. In a class with which this plan was used, there was only one boy who made no progress; the boy who improved most increased from 9 to 20. The class average in this instance was computed at stated intervals and increased regularly as follows: 6.6; 7.0; 7.0; 7.15; 7.95; 8.8; 8.91; 9.4; 10.2; 10.9.

It has been said that Francis Bacon's greatest contribution to education was made through his insistence on the utility of science. To the layman it may seem strange that either science or mathematics, often called the two most practical subjects, should ever have been esteemed for any other reason, and yet it is clear that, in the educational world, both science and mathematics are, by many, considered valuable school subjects for their disciplinary value quite apart from their utility content. While much thought has been given to this matter in recent years for the purpose of making arithmetic more immediately practical, and while as a result modern textbooks on the subject teem with supposedly concrete and useful problems, each of these concrete problems is too often the thin disguise of a principle, which, according to tradition, must be presented at its particular place in the course. With a few exceptions all textbooks present these principles in roughly the same order, so that, whatever series is used, the sixth grade will be found working on operations with advanced common and decimal fractions and denominate numbers, and the seventh grade on percentage and all its ramifications through profit and loss, commercial discount, commission, interest, insurance, taxes, stocks and bonds, and what not, — and all of the time with an eye

almost single to the development of principles and with but slight attention to genuinely practical applications and actual utility. In the words of the preface to a new series of arithmetics: <sup>1</sup>

Although the doctrine of mental discipline has professedly been abandoned by all enlightened teachers, our textbooks have not yet loosened the shackles of this formalistic view of the subject. The teaching of antiquated arithmetical processes has persisted in them, despite the fact that insufficient attention has been given to practice in the essential processes and that there is an increasing number of modern practical applications demanding attention.

The usual textbooks vary; <sup>2</sup> but, in general, reliance is placed on systematic instruction, providing for progressive steps in mathematical reasoning with the hope — as tested by results, a forlorn one — that the principles will be applied readily to any problem arising in actual experience. In a course planned for prevocational pupils it will be found much better to present problems that will teach the principle and its application at the same time.

<sup>1</sup> *Everyday Arithmetic*. Hoyt and Peet. Houghton Mifflin Company.

<sup>2</sup> Recently a number of texts have appeared in which the presentation of mathematics has departed more or less from the traditional lines. They are supposed to be "vocational." While inadequate as texts, so far as general industrial schools or prevocational classes are concerned, they offer extremely suggestive material for the teachers. Among others the following may be noted: —

*Vocational Mathematics*. William H. Dooley. D. C. Heath and Company.

*Vocational Arithmetic*. H. D. Vincent. Houghton Mifflin Company.

*Vocational Algebra*. Wentworth and Smith. Ginn and Company.

*Ludlow Textile Arithmetic*. Eaton and Brady. Ludlow Manufacturing Associates, Ludlow, Massachusetts.

*Applied Arithmetic*. E. E. Sheldon. R. R. Donnelley & Sons, Chicago, Illinois.

For example, the standing of the pupils in the school, their progress from day to day, their attendance, and many other matters of record may be reduced to "averages" and the pupils can compute these averages. Finding the average efficiency of the class for any given period and the comparison of this with later records affords not only good arithmetical computation for boys just entering the prevocational class, but it also furnishes one of the best incentives to progress.

The finding of averages leads easily to the computation of percentages for purposes of record, and, the method and principle having been practically demonstrated and actually used, and the willingness to submit to a limited amount of drill having been established, the way is plain to a sufficient amount of practice and a sufficiently varied application of the principle involved to teach all the percentage which these boys will need for some time to come.

The problems suggested on page 183, taken from the work of a prevocational class, are illustrative. An attendance table was prepared showing hours of absence of each pupil in the class each month. The questions were based on this table.

If they are to be taught at all, even such abstract and forbidding topics as the "Greatest Common Divisor" and the "Least Common Multiple" may be approached in this practical, concrete way, as is shown by the teaching in a prevocational class in which printing was the trade subject. As an approach to the subject of the greatest common divisor, the boys were given such problems as the following: "In the bindery is scrap paper 12 in., 18 in., and 24 in. long, the width being uniformly 3 in. What is the longest pad that can be cut from this

*Attendance table showing hours of absence of each pupil each month*

<i>Month</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>	<i>Jan.</i>	<i>Feb.</i>	<i>March</i>	<i>Total</i>
<i>No. of Days</i>	<i>15</i>	<i>19</i>	<i>17</i>	<i>20</i>	<i>18</i>	<i>17</i>	
<i>Pupil —</i>							
E. B.....	0	6	12	0	9	0	
C. B.....	0	3	16	9	33	10	
S. B.....	0	18	11	11	14	28	
C. B.....	0	0	0	0	30	3	
F. D.....	0	10	0	5	6	2	
A. D.....	0	0	6	1	6	19	
H. H.....	0	1	0	1	6	8	
W. H.....	12	19	10	11	19	15	
A. K.....	0	0	0	0	0	0	
W. L.....	12	22	6	4	3	9	
C. M.....	6	21	19	5	9	5	
O. M.....	7	28	11	0	0	22	
G. M.....	17	6	10	0	11	1	
W. M.....	0	7	11	0	5	0	
J. P.....	0	3	0	0	0	1	
P. P.....	7	1	0	0	0	0	
H. S.....	3	11	8	7	9	27	
P. S.....	3	2	0	20	0	0	
L. T.....	12	11	6	29	10	8	
A. T.....	58	58	12	16	12	25	
R. W.....	0	16	11	7	5	3	
K. Y.....	2	24	11	12	16	15	

*Questions*

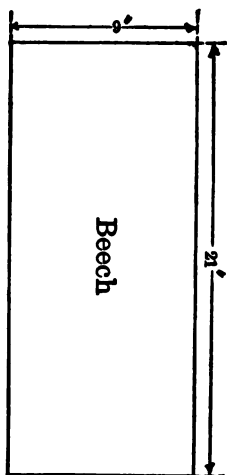
1. Find who was absent the greatest number of hours.
2. Who was absent the least number of hours?
3. Which month had the fewest hours of absence?
4. Find the average number of absences per month of each boy.
5. Which month had the best attendance?
6. Find the percentage of attendance during each month and plot a curve for the year to date.
7. Let each boy plot a curve of his own percentage of absence.

paper without waste?" The least common multiple was exemplified thus: "Test the accuracy of your composing-stick by using em quads of 10-point, 12-point, and 18-point type. To what measure should the stick be set?"

Another application of the principle of utility is to be found in correlating the mathematics definitely with some of the science work and especially with the shopwork and drawing. All of these will call naturally for some mathematics and, with the coöperation of the teachers, such work can be carried out extensively. Attention must be drawn to the fact that so-called "shop problems" cannot be relied upon as the sole source of all the arithmetic in the prevocational course. Much has been said in late years regarding the desirability of confining the arithmetic work to "related problems," but while this is excellent in theory it inevitably breaks down in practice. Notwithstanding the inadequacy of shop problems as the only source of material for prevocational arithmetic, it is unquestionably advisable to draw upon such problems for a considerable part of the course.

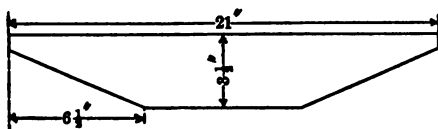
The following have been selected from a large number and a wide range of shop-related and science-related problems that have been used in prevocational classes and schools.<sup>1</sup> They are grouped under four heads, wood-working, machine-shop practice, printing, and science. *These problems are not recommended for actual use in any class, but are merely suggestive.* The actual problems must be determined by the shopwork which the particular class is doing.

<sup>1</sup> Especial recognition is made of material kindly furnished by Mr. Martin L. Olsen, Quincy Prevocational Center, Boston.



Finished size of head piece

*Blackboard sketch giving data regarding stock required for an order of fifty snow-pushers*



Details of top piece

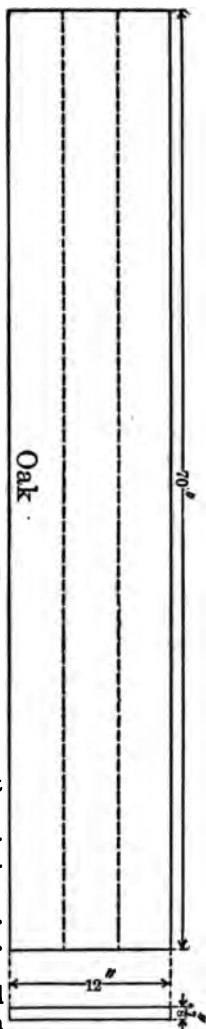
*Problems related to woodworking*

How many board feet of lumber must we order for 50 snow-pushers?

Make handles 68 in. long. Three handles from each oak board. Estimate lumber for 50 handles.

The beech boards come 45 in. long. Therefore, we get 2 heads from 1 board. Estimate lumber for 50 heads.

The beech boards come 45 in. long and 9 1/2 in. wide. How many top pieces can we get from each board?



Size of stock for handles

How much lumber is required for 50 top pieces?

At \$60 per M for beech and \$64 per M for oak, how much is the lumber bill?

Eight boys made 12 snow-pushers in 12 days. How many boys must work on another lot of 12 snow-pushers to get the job done in 3 days?

Figuring the cost of 23 broom-holders made by a prevocational class.

Name	No. of pieces	Length (inches)	Width (inches)	Thickness (inches)
Back	1	8	5	$\frac{1}{2}$
Front	1	5	5	$\frac{1}{2}$
Sides	2	5	$1\frac{1}{2}$	$\frac{1}{2}$

Back —  $5 \times 8$  in. = 40 in. B.M.

Front —  $5 \times 5$  in. = 25 in. B.M.

2 sides —  $2 \times 1\frac{1}{2} \times 5$  in. = 15 in. B.M.

Total in. B.M., 80.

Total ft. B.M. =  $80 \div 144 = \frac{5}{9}$  ft.

Cost at 9¢ per ft. =  $\frac{5}{9} \times 9¢ = 5¢$ .

Cost of 23 holders is \$1.15.

Cost of 1 pt. of varnish used to finish 23 holders, the varnish costing \$2.40 per gal., 30¢.

Cost of labor at 10¢ per hour (Average boy spent  $2\frac{1}{2}$  hours), 25¢ per holder, or \$5.75 for the lot.

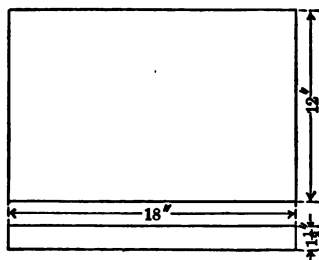
Total cost for the lot —  $\$1.15 + .30 + 5.75 = \$7.20$ .

#### *Problems related to work in the machine shop*

1. On a shoulder bolt which you will make in the shop, the threaded part is  $\frac{1}{2}$  in. long; the shoulder,  $\frac{1}{8}$  in.; the bearing,  $1\frac{1}{8}$  in.; and the head,  $\frac{3}{8}$  in. long. How long a piece of stock would you cut for the bolt? (Solve by arithmetic and drawing.)
2. If Mr. Marshall gave you the job of making four of them, how long a piece of stock would you need if you allowed  $\frac{1}{8}$  in. on each bolt for waste in cutting off?
3. On another shoulder bolt the threaded portion is  $\frac{1}{8}$  in. in length; the shoulder,  $\frac{1}{4}$  in.; the bearing,  $1\frac{1}{8}$  in.; and the head,  $\frac{1}{8}$  in. How long is the entire bolt? (Solve by arithmetic and drawing.)

4. If Mr. Marshall asked you to make three of them, how long a piece of stock would you need, allowing  $\frac{1}{4}$  in. waste on each bolt for cutting off? (Solve by arithmetic and drawing.)
5. On some brass thumbscrews which Anthony made, the threaded part was  $\frac{1}{4}$  in. long; the knurled part measured  $\frac{3}{4}$  in., and the sloping side of the head was  $\frac{1}{4}$  in. long. How long was the thumbscrew? (Solve by arithmetic and drawing.)
6. Calculate the weight of the  $12 \times 18$  in. bench block shown in sketch below, if 1 cu. in. of cast iron weighs 26 lbs.

If the foundry charges us  $3\frac{1}{4}\text{¢}$  a lb. how much does the casting cost? How much is our bill for 6 of them if we allowed a cash discount of 5 and 2 %? If we charge \$2.50 a-piece for these bench blocks, how much do we get for our labor in planing and painting them?



Bench Block

7. Estimate the weight of 10 brass paperweights  $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{1}{4}$  in. (One cubic inch of brass weighs .28 lb.) If we pay  $7\frac{1}{4}\text{¢}$  per lb. for these castings, how much is the foundry bill? As we paid within 10 days, we got 2% cash discount. How much did we pay?
8. The face plate casting for our new lathe chuck weighed  $12\frac{1}{4}$  lb. when it came from the foundry and 8 lb., 2 oz. when machined. How many pounds of chips were removed? How much did the casting cost at  $3\frac{1}{4}\text{¢}$  per lb.?
9. We have ordered from the foundry 100 adjustable desk irons. How much will the lot cost when each pair of irons weighs  $9\frac{1}{4}$  lb. and the foundry charges  $4\frac{1}{4}\text{¢}$  per lb. for the castings? In finishing these desk irons, we broke 11 castings. What per cent of the total number were broken?

What was the cost of those broken?

Bolts, nuts, and washers for the irons cost \$2.03; priming paint, \$.60; and black varnish paint, \$1.40. What was the total cost of the desk irons?

For the finished product we receive \$1.25 per set. How much is our total profit?

10. Make out a bill from the G—— Foundry to the Q—— School for these castings; also a statement to Mr. B—— of the completed job.

*Problems related to work in the printing shop*

1. How many points long is a line of type measuring  $4\frac{1}{2}$  in.? (It is a line that has been measured by the pupils.)
2. How many 12-point ems equal in length the above line?
3. A printed page (a definite page is in the pupils' mind) is 408 points long. Find its length in ems in 6, 8, 10, and 12-point type.
4. A printed page (again the pupils have a definite page in mind which they have measured) measures  $6\frac{1}{2}$  in. long. Find the number of ems in its length when set in 6, 8, 10, and 12-point type.
5. Find the number of ems in a book (a certain definite one which the pupil has examined) of 84 pages set in 8-point type, each page being 18 picas wide and 32 picas long.
6. "The Printer's Dictionary" has 380 pages, 9 of which are blank. Each page is 14 picas wide and 28 picas long. How many ems in the book, if set in 10-point type?

*Problems from science*

1. The diameter of a driving pulley is 12 in. and its speed is 300 R.P.M. What is the speed of the driven pulley whose diameter is 4 in.?
2. The driving pulley on a shaft is 40 in. in diameter and makes 30 R.P.M. How many revolutions will the driven pulley make if its diameter is 3 ft.?
3. The diameter of the driving pulley is 9 in. and its speed is 1000 R.P.M. What will be the speed of a driven pulley if its diameter is 5 in.?

4. The surface speed of a turning piece of work is 4000 ft. per minute. If its diameter is 4 in., what is its R.P.M.?
5. A certain grindstone will stand a surface or rim speed of 1000 ft. per sec. At how many R.P.M. could it run if its diameter is 40 in.?
6. A combination of pulleys has a mechanical advantage of  $4\frac{1}{2}$ . What weight could you lift with a pull equal to your own weight? With a pull of 80 lb.?
7. Could you lift a 300 lb. radiator, allowing 20 lb. to overcome friction?
8. If with the differential pulley in the shop you could lift a 640 lb. casting with a pull of 80 lb., what is its mechanical advantage?
9. If there were no friction between the parts the mechanical advantage of the differential pulley in the shop would be about 30. How much of the mechanical advantage is lost in friction?
10. We found the weight of a cubic foot of water. What is the weight of a gallon? The specific gravity of polarine is about .87. How much does a gallon of polarine weigh?

Even a casual reading of the foregoing shop problems will show how futile it is to teach "general principles" with the expectation that these pupils will be able to apply them to any and every problem which may arise.

Account-keeping is another practical application of arithmetic. It is needed by all and it furnishes an easy approach to simple addition and multiplication of whole numbers and decimals. The word "bookkeeping" has a fascination for most boys, due, no doubt, to the advertisements of business colleges and to the current idea that it is a practical subject. It should be possible to find some boy in the class who has sold the *Saturday Evening Post*, or daily papers, or who has gained, through some small business activity, the material necessary to furnish a simple beginning for this work in account-keeping. Moreover, in a well-organized school there are to be

found many different accounts which can be made available for the prevocational class and which will furnish ample exercise for a good beginning in account-keeping.

A vital aspect of account-keeping which should receive due recognition is that related to the expenditure of the family income. Such work is amply justified by the requirements of utility. It is not only desirable to teach the potential worker how to earn a larger income, but it is equally important to show him how he may spend wisely and save consistently. Inasmuch as the prevocational boys may soon contribute to the family income, and since the economic conditions in the homes of many of them are such that they must early become acquainted with the problems of home management, this subject, if tactfully presented, will produce an interested response. Furthermore it will serve to show the boys how some of the ideals established through the work in history, hygiene, and English may be realized even on a small income.

The following quotation from an authority on household management, Miss Bertha M. Terrill, will serve to bring out clearly the appropriateness of this topic. She says:—

... Through failure to distinguish intelligently between needs and wants the majority of people spend two thirds or more of their income for what fails to bring them the best results in health and happiness. There are conflicting opinions as to what vital needs are, although it would seem self-evident that they consist materially of those things which man must have to live under the best conditions, such as pure food, healthful clothing, sanitary houses, sufficient air and light, together with those things which will minister to the highest intellectual and spiritual development.<sup>1</sup>

<sup>1</sup> B. M. Terrill, *Household Management*.

Mrs. Ellen H. Richards,<sup>1</sup> after a study of actual family budgets in different parts of the country, drew up some "ideal" budgets which are reproduced in the following table:—

*Ideal division of the income for a family of two adults and two or three children*

Family Income	Percentages for				
	Food	Rent	Operating expenses: Fuel, Light, Wages, etc.	Clothing	The higher life: Books, Travel, Savings, Char- ity, etc.
\$1001-2000	25	20 ±	15 ±	20 ±	20
801-1000	30	20	10	15	20
501-800	45	15	10	10	20
500 and below	60	15	5	10	10

On the basis of this table it will be possible to compute the amount which any family having a given income should spend on the various items of the budget. This can be made extremely practical by ascertaining or estimating the actual incomes of families represented by boys in the class. Each item of the budget should be analyzed. For example, in dealing with the expenditure for food, the teacher should have access to some such material as appears in *Lessons in Cooking*, part ix, published by the American School of Home Economics, Chicago. The menu for one week in May, for example, may be dictated to the boys, including the cost of each

<sup>1</sup> Ellen H. Richards, *Cost of Living*.

item as therein presented. The pupils might be asked to verify the prices given. Having found the food cost for a week, the cost for a year is easily estimated. From this sort of work the boys will be brought to realize that intelligent buying is necessary to secure this diet, — buying in bulk, seeking out the stores which offer the best bargains, and taking advantage of the market. If each of the other items of the budget — that is, rent, operating expenses, clothing, and the expenditure for the higher life — is approached in a somewhat similar way, there will be no doubt that the basic principle of utility will be subserved. Such work is both good arithmetic and good elementary “economics,” and should help to convince the boys that arithmetic is something which is really useful in daily life.

## CHAPTER XII

### SHOPWORK AND DRAWING

WHILE the shopwork in a prevocational course of study has considerable vocational value, its major purpose is inspirational rather than vocational, its function being to give education an atmosphere which seems more practical to the pupil, and which is more closely related to active adult life than is the work of the ordinary schoolroom.

For this reason it is impossible to say that any particular type of shopwork should be given preference over all other types. In fact, where it is possible to do so, several different kinds of constructive work should be provided and the pupils should be given an opportunity to select one of these or even to experiment with all of them. As such a plan will be difficult to carry out in most communities, it is generally found desirable to select the one kind of shopwork which seems most appropriate for the locality in question. Where the community is of such a character that no special interest determines the nature of the shopwork, either carpentry, general repair work, or printing will serve excellently.

It is the purpose of this chapter to note briefly a few different types of shopwork which have proved effective in stimulating retarded pupils to an interest in education and in giving them besides some vocational intelligence. Before giving these typical examples, three

general considerations common to all prevocational shopwork will be noted. These general considerations are, the nature of the work to be done, the shop equipment, and the characteristics of the teacher to be employed.

The shopwork should be as genuinely practical as possible, and a considerable portion of it should result in a finished product of real value which may be used by the school or by some other department of the city, or which, under favorable conditions, can be put on the commercial market. The reason for this is not that the city may be enriched thereby, though there is ample reason for welcoming some financial return from this rather expensive form of education, but rather because it emphasizes the utility of the education given and because it sets a reasonable standard of workmanship which the pupils must reach before the work can be accepted. Furthermore, this practical work is less likely to become formalized and reduced to a classwork basis, a tendency which has been noted in all school courses. In this connection the principle may be reiterated, that reliance on the systematic development of a subject is to be set aside in favor of the proposition that the doing of such practical work as comes to hand will undoubtedly establish principles and theories enough to carry the pupil on to still further accomplishment. It is held that theory, unless applied immediately, is rarely carried over into power, whereas any work of a practical nature may illustrate at once both the theory and its application, or at least as much of the theory as the pupil could get from an abstract presentation of the work.

In this respect the prevocational shopwork differs materially from the typical manual-training work. The courses, in manual training in common with all other

school courses, are planned primarily for those children who make the normal progress through the school. It is expected that all the work will be done by all the members of the class in much the same way as is the work in arithmetic or geography. For this reason manual-training rooms are frequently equipped with from twenty to twenty-five benches or lathes or forges in order that the twenty or twenty-five boys in the class may all be doing the same work at the same time. More and more the practice in the prevocational class is to provide considerable variety in the practical work to be done and to consult the individual needs and aptitudes of the pupils in assigning the work. In this way a greater demand is made on the individual for the assumption of responsibility, a feature which cannot be estimated too highly.

Furthermore, it should be noted that only two or three hours a week are allowed for the shopwork when given in the typical manual-training course, and there are many instances where less time is allowed. In the case of prevocational work, however, it is common to devote from eight to fifteen hours a week to the shopwork and drawing. It is thus possible to carry the shopwork much further. Of even greater importance is the fact that the pupils spend a much greater proportion of shopwork time in the doing of actual work and less in the receiving of class instruction. In other words, the ratio of instruction to work is much less in a prevocational class than in the typical manual-training course.

Variety in the nature of the work to be done requires a corresponding variety in the equipment. Where only one room can be equipped it is desirable to bear this in mind. Instead of providing twenty carpenter's benches, each

equipped with a full complement of woodworking tools, it is much better to have half that number and to provide a wall bench with two or three metal vises, and to install a turning lathe, and possibly a hand forge and anvil.

It is desirable also to provide some opportunity for instruction in the use of machines. The kind of shop-work usually given to elementary-school pupils is largely confined to hand processes. This may be good training, and undoubtedly it is justified from the point of view of educational handwork theories. There is one fact, however, which no one in the industrial world will dispute, namely, that machinery will be used more and more in the manufacture of all kinds of industrial products. Even if all the machines in use in a factory today be replaced by others within ten years, as is so often said, still the knowledge of machinery, and the ability to handle it intelligently, will help the workman to adjust himself to the new order of things. Therefore training in the use of machinery will be of value to the future industrial worker wherever he may go.

While few communities will feel inclined to equip a prevocational shop as generously, the equipment of the prevocational room of the Milwaukee School of Trades is described herewith as an excellent example. This prevocational department, or "Preparatory Department," is similar in all essentials to prevocational schools and classes in other cities. Though located in the School of Trades and intended to be a feeder for that institution, yet it attracts the same type of pupils, and its courses are organized with the same emphasis on shop-work and on the practical phases of English, mathematics, science, and drawing. Therefore the following may serve to illustrate ideal prevocational equipment.

SHOP EQUIPMENT, PREPARATORY DEPARTMENT,  
MILWAUKEE SCHOOL OF TRADES

*Woodworking*

Each bench is used by two boys and is equipped with two groups of tools as follows:—

Group I. Individual tools, one for each boy —

- 1 block plane.
- 1 smoothing-plane.
- 1 jack plane.
- 1 12 in. back saw (13 point).
- 4 chisels,  $\frac{1}{8}$  in.,  $\frac{3}{8}$  in.,  $\frac{1}{2}$  in., 1 in.
- 1 24 in. four-fold rule.
- 1 nail set.
- 4 brass tool-checks.
- 1 sloyd knife.

Group II. Used in common by both boys —

- 2 hammers.
- 1 12-in. combination square.
- 1 mallet.
- 1 screw-driver.
- 1 marking-gauge.
- 1 India oil stone (double face) in iron box.
- 1 copper-plated oil can.

The tool-room is equipped as follows:—

- 6 rip saws, 26 in. (7 point).
- 6 crosscut saws, 22 in. (10 point).
- 3 compass saws.
- 1 frame saw.
- 1 coping saw.
- 1 hack saw.
- 3 jointer planes, 22 in.
- 1 rabbet plane,  $1\frac{1}{2}$  in.
- 1 rabbet plane,  $1\frac{1}{4}$  in.
- 1 rabbet plane, 1 in.
- 1 rabbet plane, carriage-makers'.
- 4 router planes.
- 2 shoot boards and planes.
- 6 cabinet scrapers.
- 12 6 in. spring dividers.
- 1 pair trammels.
- 3 pair calipers (outside) 4 in., 8 in., 12 in.
- 3 pair calipers (inside) 4 in., 8 in., 12 in.

- 1 pair calipers (hermaphrodite) 6 in.
- 1 6 in. monkey-wrench.
- 1 12 in. monkey-wrench.
- 12 of each size, turning chisels,  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in.,  $\frac{1}{2}$  in., 1 in.,  $1\frac{1}{2}$  in.
- 6 turning gouges,  $\frac{1}{4}$  in.
- 12 of each size, turning gouges,  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in.,  $\frac{1}{2}$  in.,  $\frac{1}{2}$  in.,  $1\frac{1}{2}$  in.
- 4 of each size, parting tools,  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in.,  $\frac{1}{2}$  in.
- 1 12 in. extension bit-holder.
- 1 16 in. extension bit-holder.
- 9 hand drills.
- 4 screw drivers.
- 7 braces, 8 in. sweep.
- 3 24 in. steel squares.
- 3 draw knives, 4 in.
- 1 miter box.
- 2 sets bits  $\frac{1}{8}$  in. to 1 in.
- 6 dowel plates
- 3 pairs pincers.
- 3 pairs pliers.
- 3 burnishers.
- 2 complete sets auger bits,  $\frac{1}{2}$  in. to 1 in.
- 4 of each size, short auger bits,  $\frac{1}{8}$  in.,  $\frac{1}{4}$  in.,  $\frac{3}{8}$  in.,  $\frac{1}{2}$  in.,  $\frac{3}{4}$  in.,  $\frac{1}{2}$  in.,  $\frac{1}{4}$  in., 1 in.
- 6 countersink bits.
- 1 moulders' bellows.
- 25 cabinet files, 8 in.
- 3 expansion bits.

In addition to the bench tools are the following woodworking machines: —

Combination rip and crosscut saw — 5 H.P. motor.

Band saw — 3 H.P. motor.

12 in. jointer — 5 H.P. motor.

24 in. planer — 5 H.P. motor.

Vertical mortiser — 3 H.P. motor.

Combination 4 emery wheel safety grinder — 2 H.P. motor.

Two units (6 in each) woodturning lathes — 3 H.P. motor for each unit.

### *Forging*

- |                         |                             |
|-------------------------|-----------------------------|
| 1 forge.                | 1 hot cutter.               |
| 1 anvil.                | 3 heading-tools.            |
| 1 ball pein hammer.     | 2 pairs straight tip tongs. |
| 1 sledgehammer.         | 2 pairs bolt tongs.         |
| 1 top and bottom swage. | 2 pairs gad tongs.          |
| 1 cold cutter.          |                             |

*Metalworking*

Benches, bench tools, and soldering outfit —

1 bench, maple top, 3 in.  $\times$  24 in.  $\times$  30 ft.

9 machinist vises.

12 cold chisels,  $\frac{1}{2}$  in.

12 cape chisels,  $\frac{1}{2}$  in.

12 ball pein hammers

24 mill files, 10 in.

24 half-round bastard files, 10 in.

1 set drills  $\frac{1}{8}$  in. to  $\frac{1}{2}$  in. inclusive (in 32ds).

3 2 in. micrometers.

3 1 in. micrometers.

6 pairs 4 in. "outside" calipers.

6 pairs 4 in. "inside" calipers.

1 set taps 6-32, 8-32, 10-32, 12-24, 14-20.

1 set stock and dies 6-32, 8-32, 10-32, 12-24, 14-20.

1 set number drills 1 to 60.

1 "Bunsen" burner.

2 blow torches.

3 soldering bolts.

1 small set bending rolls.

3 pairs metal cutting shears.

3 hack saws.

Machine tools —

4 hand metal turning lathes.

1 screw cutting lathe.

1 drill press.

1 grinder for lathe tools.

Important as equipment and product may be in a scheme of prevocational shopwork, the characteristics of the teacher in charge are of even greater moment. The principal or director who tries to secure a satisfactory teacher will find that the supply is extremely limited. He will also find that relatively little is being done to train such teachers, and that he is therefore put to the necessity of developing one for the particular position in question. Furthermore, most of this training must be given after the teacher has entered upon his work.

The two best sources of supply for the "raw material" seem to be the manual-training teachers and the so-called "practical" men from the industries. Success in either of these fields is no assurance that the man will succeed with prevocational classes, for the shopman must develop the ability to teach and the manual-training man generally needs training in industrial methods and industrial ideals, and both need most careful and sympathetic instruction regarding the purpose and methods peculiar to prevocational work.

While it may be possible to state the characteristics which these teachers should possess, it is extremely difficult to establish methods by which these characteristics may be discovered or standards by which they may be measured. In the present stage of development there seems to be but one sure method of selection, namely, to try the most likely candidate and to be ready to dismiss him and engage some one else unless he succeeds immediately in gaining the confidence of the boys and in making them enjoy the work.

But the teacher himself, particularly the shop-trained man, is entitled to instruction and help from the principal or director in charge of the work. He should have definite instruction as to the purpose of his work and as to the results which he may reasonably expect to accomplish. He should also have professional advice regarding his methods of teaching and the benefit of helpful supervision. Too frequently the shop-trained teacher is left to "work out his own salvation," an error in administration which should not be permitted to occur, and the results of which should not be charged against the shop teacher.

The success of the shop teacher should be judged, first,

by the genuine interest and enjoyment manifested by the boys in the shopwork; second, by the excellence and amount of the industrial product. It is impossible to predict whether the trained teacher or the practical shopman will most surely meet these requirements.

Some practical shopmen are natural-born teachers and learn almost immediately how to keep fifteen or twenty boys of the prevocational type busy, which means happy. Many such men, however, fail to keep the whole class occupied because of their inability to care for more than one pupil at a time. Obviously this failure results in a waste of time and a consequent lack of close application to work. Some practical men are also ultracritical and repressive, thus disheartening the boys in much the same way as did the grade teachers under whom they failed to develop an interest in school work.

On the other hand, the traditional manual-training teacher, who tries to carry all the boys along the same line and who insists on developing a high degree of technical skill, is as likely to be unfit as is the untrained practical man. After all, it is the human characteristics which are most important in the qualifications of this shop teacher, and on him and his willingness to co-operate with other teachers rests much of the success of the work. It is practically impossible to have a successful prevocational class with an unfit shop teacher.

#### ILLUSTRATIVE EXAMPLES OF PREVOCATIONAL SHOPWORK

The following material, relating specifically to the shop-work in the prevocational schools of Boston, Louisville, Kansas City, and Chicago, but containing

also some explanation of the organization and purpose of these classes, was prepared, on special request, by representatives of the work in the several cities.<sup>1</sup>

#### BOSTON, MASSACHUSETTS

##### *Prevocational Centers*

The classes are intended to consist of forty-five pupils each, fifteen of whom are in the shop, fifteen reciting, and fifteen studying at any given time during the six-hour day. There is no home study.

There are eight centers at this date, with thirteen classes, each with an instructor of shopwork, and an academic teacher. They are located as follows: —

- I. Austin Center, East Boston. Three classes: Bookbinding, Machine-Shop Practice, Printing.
- II. Quincy Center, City Proper. One class: Machine-Shop Practice.
- III. North Bennet Street Center, City Proper. One class: Printing, Woodworking, and Concrete Work.
- IV. Sherwin Center, Roxbury. One class: Sheet-Metal Work.
- V. Lewis Center, Roxbury. One class: Printing.
- VI. Winthrop Street Center, Roxbury. Two classes: Bookbinding, Woodworking.
- VII. Agassiz Center, Jamaica Plain. One class: Box-making and Woodworking.
- VIII. Lyceum Hall Center, Meeting-House Hill, Dorchester. Three classes: Electrical Work, Sheet-Metal Work, Woodwork.

The shopwork, eight to ten hours a week per pupil, in each class, is under the direction of a practical workman, and, in general, each boy will spend but a single year in a given shop, affording opportunity for vocational directive advice. The product is of a commercial character, being based on orders for general school purposes, and each center is credited with the value of goods produced.

<sup>1</sup> The Chicago material was prepared by Miss Edith Brown. See Announcement, Albert G. Lane Technical High School, 1915-1916.

Details of the equipment and work of two centers only are given herewith. The Quincy Center has one shop equipped for machine-shopwork and the Lyceum Hall Center has three shops equipped for sheet-metal work, electrical work, and cabinet-making. The inventory of the output of the Lyceum Hall Center is for the work done in the first year of the school. Much more is being accomplished in the present year.

QUINCY PREVOCATIONAL CENTER <sup>1</sup>*Equipment: Machine Shop*

<i>Year purchased</i>	<i>Name of machine</i>	<i>Cost when purchased</i>
1912	1 13 in. $\times$ 5 in. Prentice engine lathe with regular equipment of chucks, rests, and wrenches. . . . .	250.00
1912	1 14 in. $\times$ 5 in. Fay & Scott engine lathe with complete outfit of chucks, rests, etc. . . . .	240.00
1912	1 8 in. Stark bench lathe with split chucks from $\frac{1}{2}$ in. $\times$ $\frac{1}{2}$ in., wrenches and chucks. . . . .	250.00
1912	1 12 in. Seneca Falls speed lathe. . . . .	52.00
1914	1 10 in. Blount pattern speed lathe made by Quincy Prevocational Class '14. . . . .	58.00
1915	1 No. 2 Cincinnati Universal milling machine with dividing head, vise, etc. . . . .	820.00
1912	1 18 in. Hendy toolroom shaper. . . . .	280.00
1912	1 18 in. $\times$ 18 in. 48 Walter planer. . . . .	350.00
1911	1 16 in. Prentice back-geared drill press. . . . .	95.00
1910	1 8 in. Cohen Machine Company hand drill press. . . . .	12.00
1915	1 Worcester Poly-Tech design sensitive drill press made by Quincy Prevocational Class '15. . . . .	55.00
1912	1 $\frac{1}{2}$ H.P. Haltzer Cabot tool-grinder with polishing wheel. . . . .	85.00
1913	1 6 in. bench grinder, Mechanic Arts High School design, made by Quincy Prevocational Class '13. . . . .	10.00
1911	1 Wilkinson bench hand shear. . . . .	15.00
1914	1 2 hand-power hack saw from Mechanic Arts High School. . . . .	5.00

<sup>1</sup> It is interesting to note with what a limited equipment the work was started. It illustrates well the fact that it is not desirable to wait until a perfect plan can be put in operation.

1912	1 power grindstone in iron frame. ....	20.00
1912	1 $\frac{1}{2}$ H.P. Sturtevant motor and blower for gas forge	50.00
1910	24 3 in. machinist bench vises @ \$2.50. ....	75.00
1911	1 5 H.P. D.C. motor with starting panel. ....	180.00
1912	60 ft. of $1\frac{1}{4}$ in. diamond line shafting, couplings, pulleys, and belts. ....	95.00
Ordered 1915	1 16 in. wet tool grinder (Blount) . . . . .	50.00
	1 12 in. $\times$ 6 in. Reed Prentice engine lathe . . . . .	250.00
	1 12 in. South Bend engine lathe. . . . .	185.00
	1 gas forge. ....	

Total value of machine-shop equipment, exclusive  
of small tools in tool-room, at date of purchase of  
machinery . . . . . \$2825.00

Depreciation of plant and equipment is usually  
figured at 3% per annum.

Estimated present value. . . . . \$2600.00

### Output

1 speed lathe 112 in.  $\times$  4 ft., with tools, rests, centers, etc., for  
wood-turning and metal-working.

80 sets adjustable desk irons for Schoolhouse Commission.

25 snow punchers.

Frame for pulley blocks and electrical apparatus in Quincy  
School; old 1 in. pipe used.

260 blue prints for special classes.

180 blue prints for Quincy Prevocational Center.

18 blue prints for Manual Arts Department.

204 angle irons for woodworking rooms.

424 bench strips for woodworking rooms.

500 bench stop wire springs.

20 vise handles, from old pipe, for Brighton High School.

7 heavy screw drivers.

26 screw-driver bits.

Tempered and sharpened 15 wing dividers for Sherwin Prevoca-  
tional Center.

6 dowel plates with holes  $\frac{1}{4}$  to  $\frac{3}{4}$  in.

3 dowel plates (on hand).

6 cold chisels,  $\frac{1}{2}$  in.

18 solid punches

6 special scrapers

15 scratch awls

1 large cold chisel

22 vises repaired.

} for Lyceum Hall Prevocational Center.

- 4 cast-iron bench blocks (surface plates) 12 in.  $\times$  18 in.  $\times$  2 in.
- 408 angle irons for School Committee Supply Rooms delivery boxes made at Lyceum Hall Prevocational Center.
- 24 double angle irons, for Dwight School Cement Work.
- 6 tamping tools, for Dwight School Cement Work.
- 350 blackboard erasers.
- 18 clips polished and lacquered for paper files sent to Christopher Gibson School.
- Hook made for cabinet clamps for Prince School.
- 3 brackets for Agassiz Prevocational Center.
- Repairs made on guard for circular saw, Agassiz Prevocational Center.
- Nut made, with chain and lock pin.
- Completed the installation of the apparatus for the Montessori class at the Andrews School. The boys cut off some old brackets provided by the Assistant Director of Manual Arts, bored the holes to fit 1 in. pipe (second-hand), scraped off the rust, and painted pipe and screwed it on the wall. It was necessary first to fasten some boards on wall to secure the brackets. Tops were made and put on two cabinets; also hooks were made for part of apparatus.
- Repaired floor in one of the rooms of Quincy School, laying 3 new boards, and changing position of desks.
- In the spring of 1913, we made 16 adjustable devices for opening and closing the windows in the open-air class, Quincy School.
- Repaired fire escape door several times.
- Painted platform scales for the school nurse.
- Made box for school graphonola.
- Repaired vise handles and benches in Quincy Manual-Training Room.
- Repaired lock for cabinet in Room 1, Quincy School.
- Fitted and screwed name plate on flagpole for Quincy School Hall.
- Adjusted and repaired ten desks and chairs at Pierpont School.
- Repaired teacher's swivel chair.
- Repaired and adjusted 29 desks and 35 chairs, Quincy School.
- Repaired maps, bells, locks for closets, toilet and outside door.
- Painted 4 dozen old coat-hangers from Schoolhouse Commission Storehouse for use in Quincy School Prevocational toolroom and academic room.
- (The above is a very small percentage of the work of a similar nature done at the Quincy School.)
- Repaired and maintained equipment of toolroom and machinery in Quincy Prevocational Center during the past school year: —
- Made new lathe center.

Made 12 cold chisels.

Made countersinks.

Made screw-drivers and scrapers.

Repaired oil cans.

Made bolts and straps for planes, repaired large drill press, made 2 face plates for engine lathes, etc.

Estimated value of above work.....\$515.18

Job tickets are now used for repair work done by boys in the school buildings. These tickets show the actual amount of time spent on each job.

Forty boys have made for themselves small hammers and screw-drivers, valued at 35¢ and 25¢ each, respectively.

Size of class — 55 (3 divisions).

Average age — 15 years.

### LYCEUM HALL CENTER

#### *Equipment: Woodworking Shop*

Sixteen cabinet benches with rapid action vises. Each bench equipped with —

1 iron jack plane.	1 18 in. steel rule.
1 block plane.	1 hammer.
1 try-square.	1 saw (hand).
1 knife.	1 back saw.
1 spokeshave.	1 bit brace.
1 gauge.	1 bench hook.
1 file.	1 brush.
1 screw-driver.	1 pencil.

The general tools: Drills and auger bits, countersinks, files, gouges, chisels, bradawls, scratch awls, etc.

Machines: A power saw and the prospect of a jointer and a turning lathe in the near future.

#### *Output*

Arrangement of benches and fastening them to floor.

Building soldering bench in sheet-metal shop and other jobs too numerous to mention in that shop and the electrical shop. This occupied several weeks at the beginning of the work in September.

A library table for the corridor in the upper hall.

Bookcase in academic room connected with cabinet-making shop.

Tool racks.

Mail box for Department of Manual Arts.

- 50 boxes for delivery of manual-training supplies.
- 100 bench hooks.
  - 1 cabinet for U. S. Grant Prevocational Center.
- 4 manual-training equipment boxes.
- 10 alphabet boxes.
  - 1 oak desk attachment.
- 50 test-tube racks.
- 48 samples of stain on oak and whitewood.
- 200 basket bottoms.
  - 2 boxes with 9 compartments, 6 in. square.
  - 1 stand for Mather School.
  - 1 table for office of Mather School.
  - 1 table for Dillaway School Suite.
  - 1 dressing-table for Dillaway School Suite.

A great deal of work was done in the school. The boys in wood-working took up their seats and desks from one room and put them down in another room upstairs now occupied by the class in woodworking.

Each boy was allowed 20 per cent of the time for his (Grade VIII) work and each had a piece of furniture to take home at the end of the year: bookcases, Morris chairs, telephone tables, writing-tables. Seats with reed tops were among the models made, not one valued at less than \$4 and on up to \$15.

We are in a position to do much more work in 1914-15 because the rooms are now well fitted up and we can begin at the opening of school on order work.

Estimated value of the foregoing work. . . . . \$397.40

Size of class — 41 boys (3 divisions).

Average age — 14 years, 7 months.

### *Equipment: Sheet-Metal Room*

- |   |   |
|---|---|
| 2 dozen cold chisels $\frac{1}{2}$ in.  | 12 punches, cupped, 2 each $\frac{1}{2}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., 1 $\frac{1}{2}$ in. |
| 4 dozen drawing compasses.  | 2 dozen punches, solid.   |
| 4 dozen drawing pencils.  | 1 rasp.   |
| 15 drawing spacers.   | 12 rivet sets, No. 7 and no. 8.   |
| 4 dozen erasers.  | 48 rules, 12 in. flat.  |
| 15 extension bars.  | 1 dozen scrapers.   |
| 2 dozen files 8 in. flat.   | 1 screw-driver.   |
| 5 groovers — $\frac{3}{16}$ in., $\frac{1}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in., $\frac{1}{2}$ in. | 12 steel squares, 24 in.  |
| 2 8 in. hack saws.  | 15 T squares, 30 in.  |
| 1 hammer — heavy.   | 1 pair trammel points.  |
| 4 hammers — raising, 2 large; 2 small.  | 3 pairs plyers — cutting.   |
|   | 3 pairs plyers — round-nose.  |

6 lead cakes 4 in.  $\times$  8 in.  
1 wire-cutter.

4 dozen triangles, 45°, 7 in.  
4 dozen triangles, 30°  $\times$  60°, 9 in.

#### Bench tools—

15 pairs no. 9 straight snips.  
15 pairs no. 9 circular snips.  
15 riveting-hammers, no. 5.  
15 2 in. mallets.  
15 pairs flat pliers, 5 in.  
15 scratch awls.  
15 Stanley no. 68 2 ft. rules.  
15 small squares, 8 in.  $\times$  6 in.  
1 6 in. Coes monkey-wrench.  
1 10 in. Coes monkey-wrench.  
4 soldering pans no. 6.  
 $\frac{1}{2}$  dozen 1½ lb. solder coppers.  
 $\frac{1}{2}$  dozen 2 lb. solder coppers.  
1 dozen solder copper handles.  
1 Stubb wire gauge.  
1 plumbers' solder crucible.  
1 small ladle.  
1 square pan swage, no. 121.  
1 millers' square pan-former,  
no. 499.  
1 blackboard compass.  
3 blackboard triangles, 1 each,  
45°, 30°, 60°.

1 cornice brake, 48 in. long.  
1 square shear, 36 in.  
1 tin folder, 20 in.  
1 former or roller, 30 in.  
1 small beading machine and  
stand, no. 4.  
2 wiring machines.  
2 large turning machines.  
2 small turning machines.  
2 large burring machines.  
2 small burring machines.  
1 blowhorn stake.  
1 beakhorn stake, no. 2.  
1 creasing stake.  
1 coppersmith's stake.  
2 7 in. Hatchett stakes.  
1 double seaming stake.  
2 square stakes.  
1 round-head stake.  
4 Niagara stands.  
2 no. 11 hollow mandrels.  
2 4½ in. vises.  
3 no. 2 bench plates.

#### Output

Setting up benches and machines and erecting firepot bench.  
Fitting and setting hood over motor in cabinet room.  
Drip pan for squaring shears in sheet-metal room.  
Gas stove pan for Lyceum Hall.  
Register damper for classroom.  
Large garbage pail for Lyceum Hall.  
Covering bench at E. Greenwood.  
6 blueprint cases for Dorchester High School.  
3 galv. iron drip pans for Schoolhouse Custodian.  
2 galv. iron filing-cases for Department of Manual Arts.  
Covering long bench in electrical room, Lyceum Hall.  
2 emery wheel guards for Quincy Prevocational Center.  
Sign for Lyceum Hall sheet-metal room.  
36 ink-fillers for Mather School.

- 45 garbage pails with strainers.
- 40 ice-chest drip pans.
- 8 flowerboxes with pans for classrooms.
- 40 hanging conical flowerpots.
- 40 ventilators, 4 in.
- 8 umbrella stand drip pans for Hyde Park High School.
- 40 fire pots.
- 40 combination measure and funnel.
- 45 waste cans.
- Screw tray for Lyceum Hall electrical room.
- Repairing bench at Jefferson School.
- 1 auto tire tester.
- 24 shellac cans.
- 3 galv. iron plates, asbestos-lined, for Agassiz Prevocational Center.
- 40 small flower watering pots, capacity 2 quarts.
- 40 large flower watering pots, capacity 2 gallons.
- 40 mooring cans.
- 45 sets U.S. standard measures, 6 measures to a set.
- 90 scoops.
- 45 small funnels.
- 45 large funnels.
- 45 sugar caddies.
- 100 doughnut cutters.
- 10 ash-barrel covers.
- 2 large scrap barrels.
- 1 large garbage can.
- 1 large waste can.
- 2 auto drip pans for Schoolhouse Commission.
- 2 shellac cans.
- Estimated value of above work. . . . . \$426.00
- Size of class — 43 boys (3 divisions).
- Average age — 13 years, 8 months.

### *Equipment: Electrical Room*

#### Benches —

- 15 4 ft. sloyd benches, tool equipment —
- 1½ in., 3 in., 6 in., "Tuck" screw-drivers.
- 1 2 ft. rule.
- 1 medium hammer.
- 1 6 in. pair side cutting pliers.
- 1 pencil.
- 1 Walworth hinged vise bench.
- 4 4 ft. benches for general work.

**Shop tools —**

- 3 Millers Falls bit braces.
- 6 1½ lb. soldering coppers.
- 3 12 in. flat files.
- 3 15 in. level and plumbs.
- 3 12 in. rat-tail files.
- 1 Clayton & Lambert 1 quart gasoline torch.
- 1 12 in. high back hack saw.
- 3 no. 7 Diaston & Sons crosscut saws.
- 4 6 in. try squares.
- 1 set right and left ½ in. to 1 in. "Walworth" pipe dies.

**Electrical equipment —**

- Holtzer-Cabot motor generator, 110 volts A. C.
- Generator generates from 3 to 15 volts D. C.
- 1 motor generator switch board with local power company's service, 110 volts and 220 volts A. C.
- 1 "Weston" volt-meter, 3 to 150 volts D. C.
- 1 "General Electric" volt-meter, 50 to 350 volts A. C.
- 1 Mohawk Bell transformer, 110 volts to 6-10-16 volts.
- 1 sign lamp transformer, 110 volts to 10 volts.
- 40 carbon wet cells.
- 8 Samson wet cells.
- 50 no. 6 Columbia dry cells.
- 7 4 point annunciators.
- 10 Western Electrical Company open board battery call telephones.
- 4 Couch magneto call telephones.
- 2 Couch model phones.

**Shop materials and devices —**

Material for the wiring of call-bell circuits.

For the wiring of electric gas-lighting circuits.

For elementary electric lighting and switch control.

For wiring surface the boys built a structure representing the first and second floors of a house 27 feet long by 8 feet wide, which accommodates fifteen boys: eight boys on the first floor and seven on the second.

Mr. Cole, Wire Commissioner, gave the Lyceum Hall class one hundred dollars worth of electrical fittings, including an arc lamp, one sign lamp transformer, a display board of cut-outs and fuse blocks, and fittings that are of great value in electrical construction. With material given to our school by Mr. Cole, free of charge, 12 display boards were made for use in shop instruction.

Each boy was given a book containing electrical shop notes on "Electrical Work Troubles" compiled by Mr. Moriarty, printed by the Prevocational Class in the Lewis, and placed in book covers made by the Agassiz, Prevocational Center.

Electrical display boards —

<i>Articles</i>	<i>Received from</i>
Condulet fittings	Crouse-Hinds Company, Syracuse, N.Y.
B. X. cable and fittings	Sprague Electric Company, New York City.
Carbon products	National Carbon Company, Cleveland, Ohio.
Cut-out blocks	D. & W. Fuse Company, New York City.
Auger bit method of manufacturing	Russell Jennings Company.
Hard rubber	Lyceum Hall Prevocational Center.
Porcelain	" " " "
Enclosed fuses	" " " "
Asbestos and mica	" " " "
Slate	" " " "
Weather-proof sockets	" " " "
Outlet boxes	" " " "
Wire terminals	" " " "
Wire samples	" " " "
Knife switches	" " " "
Permanent magnets	" " " "
Metals used in making electrical fittings	" " " "

*Output*

Bell wiring additions and recharging of Lyceum Hall School bell batteries.  
 Wiring for a double return call bell circuit at the Department of Manual Arts.  
 Repairing bell at Public Latin School.  
 Repairing boiler light, Mather School.  
 Repairing doorbell button, John Winthrop School.  
 Installing new lighting in the manual-training room, John Winthrop School.  
 Constructing a three-party telephone line connecting Mather, Old Mather, and Lyceum Hall Schools.  
 Telephone line connecting the electrical shop with the electrical classroom.  
 Care of saw motor in woodworking room.

Estimated value, exclusive of course-work..... \$283.50

Size of class — 42 boys (3 divisions).

Average age — 18 years, 9 months.

#### LOUISVILLE KENTUCKY

The Louisville Prevocational School was opened in September, 1913, with classes in printing, bookbinding, and woodworking, aggregating thirty-two pupils, both boys and girls. So great was the interest taken in the new work and so numerous the applications for admission to the classes, that the Board of Education decided to provide more commodious quarters.

Eighty pupils, forty girls and forty boys, are accommodated in the present plant, and there is a waiting list of applicants from which vacancies are promptly filled. To the printing, bookbinding, and cabinet-making have been added electrical wiring for boys and trade sewing for girls. The printing, which includes composition, proof-reading and presswork, is open to both boys and girls.

The program of the school is planned on a half-time shop schedule, with the other half devoted to academic work which parallels that of the regular seventh and eighth grades.

Great freedom is given the pupils in their choice of shop courses, and opportunities are provided for making changes when any good reason develops for doing so. As a result their interest in the school is so great that many pupils remain after finishing the eighth grade, being anxious to continue their chosen work as long as home conditions permit.

The school is not intended for mentally deficient pupils, but for those boys and girls whose circumstances and conditions are such that they are likely to leave

school early. A number of sixth-grade pupils who are thirteen years of age have been admitted for various reasons, and for this particular group there is always an open door. The average age of the pupils is fourteen years and eight months, and the average grade is the seventh. The size of the classes is limited to sixteen pupils, and the shop instructors, with one exception, are practical trades people.

The equipment and product of only the printing-shop and bindery will be given.

*Printing Equipment, September, 1913*

- 1 10 in.  $\times$  15 in. job press, rebuilt, with short ink fountain.
- 1 8 in.  $\times$  12 in. job press, rebuilt, no fountain (7  $\times$  11).
- 2 electric motors, A. C. 110 volt,  $\frac{1}{2}$  H.P. with starting boxes.
- 1 paper cutter, 30 in., rebuilt, lever (25 $\frac{1}{2}$  in.).
- 4 extra 10 in.  $\times$  15 in. chases (cast iron).
- 4 extra 7 in.  $\times$  11 in. chases (cast iron).
- 1 gas burner, Hickok, with connections.
- 2 gluepots, 1 quart double jacket.
- 1 font 36 point type, caps and lower case.
- 1 " 24 " " " " " " "
- 1 " 18 " " " " " " " "
- 1 " 12 " " " " " " " "
- 1 " 10 " " " " " " " "
- 1 " 8 " " " " " " " "
- 1 " 6 " " " " " " " "
- 150 pounds 10 point body type with spaces and quads.
- 50 pounds 8 " " " " " " " "
- 1 type cabinet no. 62 F. T. New Departure, 25 drawers full size with mortised label-holders.
- 2 2  $\times$  12 Buckeye composing sticks.
- 6 2  $\times$  8 " " "
- 6 2  $\times$  6 " " "
- 5 dozen pairs quoins, no. 1 Challenge Hemphill.
- 5 keys for above.
- 6 tweezers.
- 2 dozen gauge pins, spring tongue.
- 1 all brass galley, 9 in.  $\times$  14 in.
- 4 " " " 6 in.  $\times$  10 in.
- 4 " " " 8 $\frac{1}{4}$  in.  $\times$  13 in.

- 4 planers, 3 in.  $\times$  6 in. maple.
- 1 bellows, small.
- 9 line gauge rules, wooden.
- 4 proof planers,  $3\frac{1}{2}$  in.  $\times$  8 in.
- 1 palette-knife, 6 in., style A.
- 1  $2\frac{1}{2}$  in.  $\times$  36 in. imposing stone (no frame).
- 10 pounds extra quads, 10 point; 1, 2 and 3 M.
- 5 pounds " " 8 " 1, 2 and 3 M.
- 1 pair steel roller supporters, 10 in.
- 1 " " " " 7 in.
- 2 one pint benzine cans, brass safety top Success.
- 1 6 point assorted quads and spaces, job fonts
- 1 8 " " " " " " "
- 1 10 " " " " " " "
- 1 12 " " " " " " "
- 1 18 " " " " " " "
- 1 36 " " " " " " "
- 1 table knife.
- 1 no. 4 reglet case, half pica and half nonpareil, 2100 pieces.
- 1 case no. 12 labor-saving furniture, 560 pieces with case.
- 3 packages metal furniture,  $2 \times 4$  to  $2 \times 10$ , 12 pounds.
- 3 pound font labor-saving brass rule,  $\frac{1}{2}$  point face with face on side (2 point rule).
- 3 pound font labor-saving brass rule,  $1\frac{1}{2}$  point face with face on side (2 point rule).
- 100 pound 2 point leads, labor-saving with lead and slug case.
- 3 blue brushes, round no. 5 rubber set Russia.
- 1 benzine brush, bristle.
- 6 bone folders, 7 in.

*Additional Printing Equipment, September, 1914*

- 1 job press, 8 in.  $\times$  12 in., new C. & P., complete for motor.
- 1 electric motor, 110 volts,  $\frac{1}{2}$  H.P., Kimble.
- 3 extra 8 in.  $\times$  12 in. chases (cast iron).
- 1 type cabinet no. 62 F. T. New Departure, 25 drawers full size with mortised label-holders.
- 2 palette-knives, 6 in., Style A.
- 3 brayers, 6 in.
- 1 imposing stone,  $2\frac{1}{2}$  in.  $\times$  36 in., no frame.
- 6 pairs steel roller supporters, 8 in.
- 1 5 pound font labor-saving brass rule, 2 point with  $\frac{1}{2}$  point face on side.
- 1 no. 00 Challenge proof press, 9 in.  $\times$  27 in. bed, without stand (new or second hand).
- 1 font 36 point Author's Old Style.

2 fonts	6 point	Old Style no. 59	italics.						
2 "	8 "	"	"	"	"	59	"		
1 font	10 "	"	"	"	"	59	"		
2 fonts	12 "	"	"	"	"	59	"		
1 font	12 "		no. 8	Light	Copperplate	Gothic.			
2 fonts	12 "	"	5	"	"	"	"		
2 "	6 "	"	3	"	"	"	"		
1 font	18 "	"	29	Heavy	Copperplate	Gothic.			
1 "	12 "	"	27	"	"	"	"		
2 fonts	6 "	"	24	"	"	"	"		
2 "	6 "	"	22	"	"	"	"		
1 font	18 "	"	79	"	"	"	"	extended	
1 "	6 "	"	74	"	"	"	"	extended	
1 font	18 "		Shaw	Text	Series.				
1 "	12 "	"	"	"	"	"	"		
1 "	10 "	"	"	"	"	"	"		
1 "	72 "	"	Della	Robbia.					
1 "	30 "	"	"	"					
1 "	18 "	"	"	"					
1 "	10 "	"	"	"					
1 "	72 "	"	assorted	spaces	and	quads,	job	fonts.	
1 "	30 "	"	"	"	"	"	"	"	
4 fonts	18 "	"	"	"	"	"	"	"	
7 "	12 "	"	"	"	"	"	"	"	
3 "	10 "	"	"	"	"	"	"	"	
2 "	8 "	"	"	"	"	"	"	"	
9 "	6 "	"	"	"	"	"	"	"	
5 ft.	6 point	Border	No.	675,	B. B. & S.				
5 "	6 "	"	"	"	691, B. B. & S.				
5 "	6 "	"	"	"	687, B. B. & S.				
4 1/2 "	12 "	"	"	"	1245, B. B. & S.				
3 "	18 "	"	"	"	507, B. B. & S.				
1 ornament	No. 48029,	American	Type	Foundry.					
4 ornaments	No. 42010,	American	Type	Foundry.					
1 ornament	No. 34	Kate	Greenaway,	American	Type	Foundry.			
1 ornament	No. 51	Kate	Greenaway,	American	Type	Foundry.			
8 composing	sticks,	2 in. X 6 in.	"Star"	nickel-plated	steel.				
6 "	"	2 in. X 8 in.	"	"	"	"	"	"	
2 "	"	2 in. X 12 in.	"	"	"	"	"	"	

*Bookbinding Equipment, September, 1914*

4 shoemaker's hammers.	10 dozen needles, assorted.
8 shoemaker's knives.	4 bradawls.
6 pairs shears, 8 in.	2 long-bladed knives.

6 lithograph stones, 12 in. X 14 in.	3 fonts brass type.
1 sandstone (whetstone).	1 button-fastener machine.
1 pair dividers, 8 in.	1 punching machine and 3 dies for same.
1 round corner gouge.	1 eyelet punch.
1 dozen bone folders.	1 back saw.
2 paring knives.	2 glue kettles.
1 standing press, 16 in. X 24 in.	2 paste pots.
4 brass-bound boards for press.	1 dozen glue and paste brushes, assorted sizes.
5 laminated boards.	1 gas plate.
1 case gauge.	1 dozen brass edge rulers.
1 backing machine, 24 in. jaws.	4 belt punches, assorted sizes.
1 backing hammer.	1 gold cushion, knife, etc., for lettering.
1 sewing bench from factory.	
6 sewing benches made in school shop.	
1 lettering pallet.	

The variety possible in printing and bookbinding is so great that a detailed statement of all the work done cannot well be made here. It should be said, however, that much of it is on a commercial basis and all is eminently practical. An early circular of the school contains the following statements: —

Work has been sent to the class by the Board of Education, the Parent-Teacher Associations, Social Centers, and many philanthropic and civic organizations. The work done for the Board of Education and the money received from outside jobs are credited to the class on the books of the Board of Education. The following is a partial list of the jobs done: —

Parent-Teacher Association notices, dodgers, tickets, letter- heads, envelopes.....	9,920
Principal's notices.....	3,650
Supervisors' outlines or bulletins.....	1,250
Board of Education circulars.....	30,500
Consumers' League notices.....	2,400
Louisville Educational Association notices and tickets.....	1,800

In five months, from September to February 1, the class made 91,500 impressions.

At the end of the job, the job envelopes contain copy, proof, revise, pressproof, and finally three copies of the job. On the

wall are time-cards showing each child's record upon each part of each job. Proof-reading is accentuated for the girls. A good proof-reader in Louisville may command from \$15 to \$20 a week, and many places are filled by women. High upon the walls stands a time-clock, by means of which the time spent upon each job is computed by the unit system in use in factories.

The printers of the city have taken a generous interest in the work. A visiting printer happened to find the shop busy turning out an order for twenty-six thousand envelopes for the School Children's Thanksgiving Fund. The time-card showed fifteen hundred envelopes struck off in an hour and a half. The wastebasket showed only nine spoiled envelopes. This record for time and waste he declared would stand comparison with more experienced labor.

A few examples of the work done in printing, selected from a great variety, are shown (pp. 218-220).

#### *Bindery jobs*

Theme tablet covers for entire school. Full cloth turned in and lined with paper — punched and eyeleted to fit punched tablet.

End fold notebooks. Newspaper stock — tag-board covers — thread-stitched — cloth strip on back of fold.

Envelopes of various sizes for school use (mailing).

Advertisement cards — punched and strung.

Making pads — count, glue, cut apart — wrap in packages.

Pocket memorandum books. Tag-board cover — thread-stitched — cloth strip on back.

Pass books — full cloth.

Pass books — full leather.

Renewable pads — memorandum.

Paper perforated. Covers made of leather — lettering black or gold.

P. T. Association programs. Folded, stitched with silk.

Desk blotter holders — cloth corners.

Desk blotter holders — leather corners.

Magazines bound — cut flush.

Magazines bound — full cloth.

Portfolios. Full cloth with 3 flaps.

Leather card cases. Fold in center. Made throughout with paste.

Scrapbooks — loose leaf.

Scrapbooks — sewed.

LOUISVILLE, KY., \_\_\_\_\_ 191

M \_\_\_\_\_

*in account with***PREVOCATIONAL SCHOOL**

8TH AND CHESTNUT STREETS

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**MANUAL TRAINING HIGH SCHOOL****Night School Enrollment Card**

Name \_\_\_\_\_

Address \_\_\_\_\_

Occupation \_\_\_\_\_

Where employed \_\_\_\_\_

If not now employed \_\_\_\_\_

Where last employed \_\_\_\_\_

Course desired \_\_\_\_\_

# JOB TICKET

File\_\_\_\_\_

Job No.\_\_\_\_\_

Date\_\_\_\_\_

For\_\_\_\_\_

Deliver at\_\_\_\_\_

Quantity\_\_\_\_\_ Size\_\_\_\_\_

Description\_\_\_\_\_

Promised\_\_\_\_\_

COMPOSITION			PRESSWORK		
Compositor	Hours		Color of Ink_____		
			Remarks_____		
			Pressman	Hours	

PUT COPY, PROOF AND THREE SAMPLES IN TICKET<sup>1</sup>

<sup>1</sup>The ticket is printed on an envelope.

3 7 3 8 2 6 9 3 6 8	6 2
5 9 4 8 2 9 6 3 8 4	6 7
5 8 3 6 4 7 6 5 9 6	9 3
8 4 2 5 9 7 5 9 2 3	2 5
8 2 8 9 4 6 2 7 9 5	2 7
9 3 6 6 5 8 4 8 3 2	7 5
9 4 7 8 8 2 9 2 7 6	2 6
7 3 8 5 3 6 6 7 6 9	7 9
8 7 5 8 9 2 6 9 4 3	7 4
7 5 8 7 2 8 9 2 6 8	8 7
7 8 6 5 6 5 3 5 7 7	2 9
3 7 8 5 3 2 8 3 9 8	2 7
6 6 7 4 4 5 4 7 6 6	9 4
4 2 3 2 9 5 8 7 5 5	4 6
9 2 7 8 2 4 5 7 4 9	9 9

Printed in quantity for arithmetic drill in the schools

Loose-leaf post card albums.

Bill folds — full leather — silk lined.

Passbooks — bound in leather (tan) — name on front.

Passbooks — full leather with pencil-holder, pocket and flap with button.

Fancy calendars for holidays.

Magazine binding — leather back and corners — boards laced on.

Magazines bound in leather with hand-decorated end sheets.

Filing cases — full cloth — 3 pockets on each side of fold.

Circulars — four-page fold, count, wrap.

The outlook for next year is most promising, when, with a larger building, the enrollment is expected to reach one hundred and twenty pupils.

#### KANSAS CITY, MISSOURI

##### *Lathrop School*

The Lathrop School for Boys, in Kansas City, Missouri, is open to all boys of the city who have completed the fifth grade<sup>1</sup> in the elementary schools, or who are twelve years of age or over. It is a prevocational school and intended to offer prevocational experiences in carpentry, shop electricity, plumbing, painting, cabinet-making, wood-turning, and printing.

On entering the school the boys are advised, after consultation, to enroll in certain classes in which they seem to have a desire to work. They are not permitted to change their shop subjects until the expiration of ten weeks, at which time if they wish they may select some other shop. At the end of twenty weeks they are expected to change shops, and at the end of one year all boys are compelled to change shops for new experiences, unless excused for some good and sufficient reason.

The boys who make the changes every ten weeks are

<sup>1</sup> There are but seven grades in the elementary schools of Kansas City.

thereby able to obtain experiences in eight different lines of shopwork during the two years. On an average, each boy obtains experiences in three or four of these shop courses. Some are in attendance only one year, having enrolled at the beginning of the seventh grade.

On the completion of their course in this school they are encouraged to attend the Vocational High School. About fifteen boys who graduated from the Lathrop School last year are in attendance at this high school. The prevocational training given in the Lathrop School aids the boys quite materially in "locating" themselves at once in the kind of work they expect to follow. It also gives them a general hand training and skill in the use of tools, which is not noticeable in boys enrolling from the other schools.

At the Lathrop School the boys spend one half the time in the shops, and one half in the study of academic subjects, including mechanical drawing.

Details of the equipment and output of the classes in wood-turning and cabinet-making only are given herewith.

#### *Equipment of wood-turning shop*

10 benches.	10 chisels, skew, 1 in.
6 bevels, "T," 3 in.	1 set pattern makers' clamps.
13 bits, auger.	23 clamps, hand.
1 bit, expansive.	1 clamp, saw.
3 braces, ratchet, 5 in.	12 clamps, carriage.
3 brushes, varnish, 2 in.	6 countersinks.
10 calipers, 6 in.	10 dividers, wing.
2 calipers, inside.	2 drills, $\frac{1}{16}$ in.
10 chisels, $\frac{1}{4}$ in.	2 drills, $\frac{7}{16}$ in.
10 chisels, $\frac{1}{2}$ in.	2 drills, $\frac{1}{2}$ in.
10 chisels, $\frac{3}{4}$ in.	2 drills, $\frac{5}{8}$ in.
10 chisels, 1 in.	3 files, 3-cornered.
10 chisels, skew, $\frac{1}{4}$ in.	16 files, 6 in.
10 chisels, skew, $\frac{1}{2}$ in.	1 file, flat.

1 grindstone.	3 rasps, flat.
5 gauges, marking.	3 rasps, half round.
10 gouges, $\frac{1}{2}$ in.	10 saws, back, 12 in.
10 gouges, $\frac{1}{2}$ in.	10 saws, crosscut.
10 gouges, $\frac{1}{2}$ in.	2 saws, keyhole.
10 round-nose tools, $\frac{3}{8}$ in.	10 saws, panel.
10 round-nose tools, $\frac{1}{2}$ in.	1 saw, band.
10 parting tools, $\frac{3}{8}$ in.	1 saw set.
1 brazing clamp.	6 scrapers, cabinet.
8 extra line centers for lathe.	10 screw-drivers.
9 gouges, $\frac{1}{2}$ in.	3 spoke-shaves.
9 gouges, $\frac{1}{2}$ in.	2 squares, framing.
4 hammers, claw.	10 squares, "try," iron-stock, 8 in.
3 knives, draw, 8 in.	15 stones, oil.
11 lathes, with equipment.	10 stones, "slip."
10 mallets, wooden.	1 emery dresser.
5 nail sets.	4 rivet hammers.
10 oilers, tin.	6 pattern knives.
6 planes, block.	1 wood trimmer.
1 plane, circular.	6 band saws.
10 planes, jack, iron, 14 in.	1 pair brazing tongs.
2 planes, smoothing, iron, 7 in.	1 glue cooker.
1 pliers.	

*Output of wood-turning shop*

<i>Project</i>	<i>Made for</i>	<i>Cost of material</i>	<i>Market value</i>
11 dozen old dumb bells returned	Supply Department		
24 indoor ball bats	" "		
12 outdoor ball bats	" "		
21 pair $\frac{3}{4}$ lb. Indian clubs	" "		
21 pair 1 lb. Indian clubs	" "		
18 pair 1 lb. Indian clubs	" "		
6 pair $1\frac{1}{2}$ lb. Indian clubs	" "		
2 dozen $3\frac{1}{2} \times 6$ in. mallets	" "		
24 chisel handles	" "		
20 stools, poplar (3 24 in. and 17 18 in. high)	" "		
1 oak stool, 26 in. high	" "		
18 oak stools, 24 in. high	" "		
18 oak stools, 18 in. high	" "		
2 oak stools, 28 in. high	" "		
19 stools, gum (3 24 in. and 16 18 in. high)	" "		

## PREVOCATIONAL EDUCATION

<i>Project</i>	<i>Made for</i>	<i>Cost of material</i>	<i>Market value</i>
8 oak stools (2 24 in. and 6 18 in. high)	Supply Department		
12 pair calisthenics rings 6½ in.	" "		
6 dozen old Indian clubs, refinished	" "		
500 7-16 dowels	" "		
1 dozen file handles	" "		
4 hammer handles	" "		
6 dozen pair Indian clubs 15 in.	" "		
336 old dumb bells, refinished	" "		
1½ dozen mallets	" "		
48 chisel handles	" "		
20 duck pins	Play-Room, Lathrop School		
10 stools (4 18 in. and 6 24 in. high)	Supply Department		
104 dumb bells	" "		
114 old dumb bells, refinished	" "		
100 old Indian clubs, refinished	" "		
158 Indian clubs	" "		
26 mallets	" "		
62 calisthenics rings	" "		
24 chisel handles	" "		
18 hammer handles	Central High School		
70 stools, 18 in. high	Supply Department		
96 dumb bells	" "		
14 hammer handles	" "		
48 calisthenics rings	" "		
650 dowel pins	Manual-Training High School		
184 Indian clubs	Supply Department		
12 dozen chisel handles	" "		
40 stools	" "		
Total		\$159.95	\$315.15

*Equipment of cabinet shop*

12 benches — double.	3 braces — ratchet, 8 in.
8 bevels — "T," 3 in.	18 brushes — desk.
30 bits — auger.	42 chisels — ½ in.
1 bit — extension.	33 chisels — ¾ in.
2 bits — screw-driver.	33 chisels — 1 in.

4 chisels — $1\frac{1}{2}$ in.	1 miter box and saw.
5 clamps — carriage.	2 nail sets.
12 clamps — hand.	1 oiler — tin.
1 clamp — saw.	2 planes — block.
4 clamps — 4 ft. carpenter's.	23 planes — jack, iron, 14 in.
4 clamps — 4 ft. wooden.	1 plane — jointer.
4 countersinks.	10 planes — smoothing, iron, 7 in.
8 wing dividers.	1 pliers.
2 drills — $\frac{1}{8}$ in.	8 rasps — half round.
5 drills — $\frac{1}{4}$ in.	6 rules — 2 ft.
5 drills — $\frac{5}{8}$ in.	8 saws — back, 12 in.
6 drills — $\frac{3}{4}$ in.	4 saws — cross cut.
1 emery wheel.	2 saws — keyhole.
12 files — mill.	10 saws — panel.
6 gauges — marking.	4 saws — rip.
12 hammers — claw.	1 saw — turning, 14 in.
1 hatchet — shingle.	1 saw set.
24 plane bits — no. 5 jack.	3 scrapers — cabinet.
1 dowel plate.	8 screw-drivers.
2 gluepots.	1 spoke-shave.
1 stone, oil.	1 square — framing.
1 knife, draw — 8 in.	8 squares — steel no. 12.
16 knives — chip carving.	1 square — try, wood stock, 12 in.
24 mallets — wooden.	22 squares — try, iron stock, 8 in.

*Output of cabinet shop*

<i>Project</i>	<i>Made for</i>	<i>Cost of material</i>	<i>Market value</i>
49 primary tables	Supply Department		
17 drawing tables	Irving School		
25 6 ft. step ladders	Supply Department		
Repairing 14 stools	Printing Shop, Lathrop School		
1 set of school bank fixtures	Ashland School		
12 primary tables			
Total		\$49.03	\$127.90
1914 Summer Class constructed one two-room school annex building (material and labor)		\$2286.83	\$2600.00

The classes in the wood-turning shop average 21 pupils, and in the cabinet shop, 24. They average 14 years and 9 months and are about evenly distributed between the fifth, sixth, and seventh grades.

PREVOCATIONAL DEPARTMENT,  
THE ALBERT G. LANE TECHNICAL HIGH SCHOOL, CHICAGO

The distinctive feature of the organization of prevocational work in Chicago, as was noted in chapter IV,<sup>1</sup> is that the pupils have the unusual advantage of using the same buildings and much of the same equipment as regularly enrolled pupils of the technical high schools. In the Albert G. Lane Technical High School, nearly three hundred prevocational boys receive instruction during the year. They rank as sixth, seventh, and eighth grade pupils, but individuals are frequently found in one or more of the regular high-school classes, even before they complete the elementary-school work, as many of the boys do eventually, receiving diplomas and enrolling as high-school students in all their subjects. The plan preëminently encourages individual progress, which makes it difficult to describe in detail the work of the whole group. This is true of the shopwork subjects, and, if one were to set forth in detail the remarkable opportunities for technical training open to these prevocational classes, it would be necessary to give a complete inventory of the equipment of all the shops. Such an inventory will not be given here, but a few of the exceptional features will be mentioned as indicative of the atmosphere which pervades the school life of these boys.

In addition to the usual woodworking, forge, foundry, and machine-shop equipment of most well-planned

<sup>1</sup> Prevocational classes are cared for in the four technical high schools for boys and in the Lucy Flower Technical High School for girls. In addition to this there are classes of a somewhat similar nature in sixteen of the elementary schools of Chicago.

technical high schools, the Lane Technical High School has an elaborate printing-plant, including a number 4 cylinder press, two linotype machines, four monotype keyboards and two monotype casting-machines. The electrical shop is fitted up for fairly heavy motor work at a cost of \$12,000. In addition to the usual forges, the forge-shop equipment includes a 4 H.P. shears and punch, a gas forge, and a 500 pound steam hammer. The woodworking shop is liberally supplied with planers, band saws and circular saws, while the machine-shop equipment is especially elaborate, being valued at \$60,000.

It must not be assumed that the entire equipment can be placed unreservedly at the disposal of the prevocational classes, and that, therefore, the problem of caring for these boys is a comparatively easy matter. On the contrary, the hospitality is extended to the prevocational boys notwithstanding the fact that the Lane School is accommodating double the number of pupils for which it was originally planned. For example, the electrical shop cares for fifty pupils at a time, which is twice the number for which the shop was equipped, while the machine shop, planned for seventy-two boys, at times accommodates as many as one hundred and twenty. This crowded condition naturally curtails the advantages accorded the prevocational boys, and precludes as wide a range in the choice of shops, for entire classes, as is desirable. But even with these handicaps the shopwork is a success, as is attested by the attendance and attitude of the pupils themselves.

The majority of the prevocational boys work in the forge shop, woodworking room, pattern-making shop, machine shop, and printing department.

Brief outlines of typical courses given follow: —

### *Forging*

The forge work includes exercises in the processes of forging wrought iron and steel, such as: drawing; bending; twisting; welding; making and tempering lathe and planer tools and chisels. Some work is given also in ornamental forging.

Among the articles made are: —

Staples and "S" hooks.	Fern stands.
Twisted gate hooks.	Shovels.
Gate hinges.	Tongs.
Links, ring and hooks for chain.	"Pushmobiles."
Bicycle stands.	

### *Woodworking*

Joinery and simple cabinet-making, involving elementary tool practice and resulting in such articles as: —

Stools.	Umbrella stands.
Tabarets.	Card tables.

Certain articles for school use are made under the factory system of production, which involves the working on such assignments as laying out, finishing, assembling, and checking. Practical experience is obtained in the use of woodworking machines and labor-saving devices. This results in a working knowledge of shop and factory practices.

Articles like the following for school use are made in quantities:

Bench hooks.
Boxes for parting sand.
Oilstone cases.

In correlation with the wood-turning shop and the foundry, coöperative class work is done, from time to time, upon some small scientific project like a model for an aeroplane. This work ties up with vital out-of-school interests and furnishes material for practical problems in mechanics. The inventive faculties of individuals find an outlet for expression through informal work of this nature, and incentive is furnished for practical experiment.

The boys in the woodworking class are called upon to make general repairs and to do considerable "handy work" of a constructive nature around the building, the activities of this technical high school providing a large amount of varied and valuable work of this character.

### *Pattern-making*

The course in pattern-making, while planned to teach the principles of the making of wood patterns for castings, is correlated with the work in the machine and electrical shops in such a way that the pupils, while making patterns for parts, learn considerable about the mechanical principles involved in the completed article.

Work is done on such articles as: —

Vacuum cleaner.	Electric lamp.
Electric blue-printer.	Rheostat.
Motor headstock lathe.	Tuning coil.
Gas engine.	Telegraph sounding coil.
Shocking coil.	Bench lathe.
Galvanometer block.	

### *Machine-shop practice*

Work on drill presses, planers, lathes, milling machines and boring machines.

Some of the minor projects made are: —

Hammer.	Marking gauge.
Depth gauge.	Spirit level.

The principal work of the shop centers around the making of the following articles: —

Woodworking vises.	Jack screws.	Bench lathes.
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### *Printing*

Elementary composition.  
Imposition.  
Make-ready on Gordon press.  
Make-ready and feeding on Gordon press and cylinder press.  
Simple forms of binding.

Prevocational pupils work in coöperation with the high-school students on such jobs as the following: —

Announcements, posters, programs and tickets for

Athletic events.

Musical and dramatic entertainments.

Vocational Education Association of the Middle West.

Educational material for neighboring schools.

Letter-heads, office blanks, and educational material for the Lane School.

Year-book.

Monthly magazine (Tech Prep.).

Daily paper, morning and evening edition.

As stated before, the conspicuous advantage of the Chicago plan lies in the fact that the boys may progress as individuals and quite independently of the requirements usually demanded for promotion by classes. In the machine shop, which is ordinarily reserved for third-year high-school pupils, prevocational boys are working successfully with the high-school students. Several are being cared for in the freehand drawing department and are doing work which compares favorably with that of the more advanced students. In the electrical department the wireless operator is a former prevocational boy who entered the fourth-year electrical course while still in the prevocational department. He is now devoting most of his time to wireless work and intends to adopt it as a profession later.

Regarding the progress of the pupils as a whole, it is with satisfaction that the teachers and the parents of these boys bear witness to the fact that it is eminently satisfactory, due, they believe, largely to the association of the pupils with the high-school spirit, activities, and ideals. They seem to lose their identities as "failures,"

and the high school becomes a real goal, which, they are convinced, is possible of attainment because of the tangible opportunities which it daily presents.

#### DRAWING

In common with much of the other school work, drawing should be taught to prevocational classes with full recognition of the fact that the pupils have had previous instruction in the subject for a period of six or seven years. If such instruction has developed or revealed marked ability in graphic expression, some arrangement should be made, if possible, to give special attention to the individual, preferably in some good high-school class or classes in drawing and design. Such cases, however, will be rare, and the principle of arranging the prevocational course in drawing will be relatively simple and may be stated as follows. The work in drawing should be of such a nature that it will contribute directly to the pupil's ability to understand his shopwork better and to do it more intelligently. In other words, formal instruction in drawing along the traditional lines of representation, construction, design, color, and art appreciation must be abandoned for something more intensive and more immediately applicable, and the particular form of the drawing should be determined primarily by the kind of shopwork in which the pupil is engaged.

A class working in the printing-shop or studying sign-painting should have the kind of drawing which deals with design in the flat or in two dimensions mainly. Such drawing would include the study of spacing for printing in either book, job, or poster work, freehand layouts, the form, proportion, and actual measure-

ments of letters, and color as applied to the selection of papers and inks. Relatively little attention should be given to work in perspective or in constructive drawing, except such geometrical work as will help the pupil in designing and laying out pages, decorative borders and job work generally.

For the machine-shop class little attention need be given to design and color, but emphasis should be laid on the making and reading of working drawings. Such work should include much freehand sketching of details both in perspective and in orthographic projection, involving three-dimension objects. The putting on of dimensions is extremely important, as is also the study of such geometric drawing as will help the pupil to be accurate in his work and to understand more clearly the elementary principles of construction and the mechanism of the machine tools which he uses.

A class in sheet-metal working should be given the elements of descriptive geometry, intersection of solids and the development of surfaces, while one in electrical wiring, carpentry, or plumbing should have, among other things, the making and reading of house plans or such phases of architectural drawing as will relate most closely to the industrial work in which the pupils are engaged.

In all these forms of drawing, however, both freehand and mechanical work should be done, and should be combined. It is never desirable to confine the work to any one line, such as is followed, for example, in the traditional course in "mechanical drawing," where a line is never drawn without mechanical aid, or the typical course in "freehand" drawing, where it is sometimes considered a technical error to draw anything

“accurately.” The two should go hand in hand, and much freehand sketching of working drawings should supplement the mechanical work. If mechanical work only is done, too little progress can be made because such work consumes an extravagant amount of time.

Above all, it should be remembered, and should be made perfectly clear to the pupils, that drawing is the language of industry and that the way to learn a language is to use it. Therefore diagrammatic drawing should be used constantly by all teachers, especially in dealing with anything related to the shopwork. It should never be overlooked that the ability to employ graphic expression is a most important asset to any industrial worker.

## IN CONCLUSION

**AFTER** all, the criterion by which any school will stand approved is the esteem in which it is held by those who, as students, come under its influence.

The prevocational school is a new structure, standing upon its own foundations and unbuttressed by tradition. Its stability will be assured when those now receiving and appreciating its benefits have gone out into the world and have borne testimony to its excellence.


It is now only just rising from its foundations, and the children, who are at once its occupants and its builders, are those upon whose judgment, at the present time, we can most safely rely. The quotations on the following pages, taken from the issues of a prevocational journal, indicate something of the spirit of these schools and also show the regard in which their various activities are held by the pupils themselves.

The hopeful assurance of the youthful contributors to *The Workmaster* is one of many reasons for the confidence with which the authors of this book send it forth to work for the improvement of educational opportunities for children everywhere.

VOL. 2 NO. 2

# **THE WORKMASTER**

**IN THE INTEREST OF THE  
PREVOCATIONAL CENTERS OF  
THE BOSTON PUBLIC  
SCHOOLS**



**FEBRUARY, 1915**

**PUBLISHED BY  
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LEWIS SCHOOL, ROXBURY**

We have begun to run the three-horse power electric saw. We all must have a permit to run it. This permit is signed by our parents, so that if there is any accident, through carelessness on our part, the instructor is not held responsible. If orders are disobeyed, the permit is taken away. This is a very good rule for our benefit.

The sheet-metal work has begun in the Sherwin School, and has proved a great success.

Many useful things have already been made by the pupils of the Prevocational Class, such as doughnut cutters, boxes, funnels, etc.

We were greatly interested to find how different the stretch-out of the models looked from what they did when they were made up.

It is surprising to learn the cost of an article; for instance, the doughnut cutter, which one can buy at the store for ten cents, costs about one third of a cent for material.

Morris Cohen did not come back this year. He is working in a printing-office in Boston.

Most of the boys of last year's class are again at school. Six have entered the Mechanic Arts High. Martin Taylor, captain of the ball team, has entered the sheet-metal class at the Boys' Industrial School. Stanley Muir has been employed during the vacation at the office of the United Shoe Machinery Company, and we were pleased to know that through his strict attention to business, he received weekly a dollar more than is usually paid for such work. He has entered the Commercial High and we hope he will continue to make good.

A well-known drawing teacher, Miss Cleaves by name, addressed the boys on the subject of making explanations more plainly by drawing.

She also told us a true proverb which may teach us not to try to know everything. It was, "It takes the whole world to know everything." Altogether it was a very helpful talk. Most of us learned a good deal and we were grateful to Miss Cleaves.

One day last week the class went with Mr. Olsen to the Gibby Iron Foundry in East Boston.

The foundry was very interesting, indeed. There are about 30 or 40 molders, and they were molding a steam boiler front in sand.

Outside in the yard they were breaking up pig iron and mixing it with scrap iron before they melted it. We saw them make our desk-iron castings that we finish in our school shop.

The sight of the molten iron as it came from the furnace was most wonderful and enjoyable.

One of the teachers in our school had an old watering-pot which she thought was ready for the ash-heap. I took it to the shop-room to see what could be done with it. I found holes, rust, and dents in the bottom. I took off the bottom, put on a new one, hammered the dents from the sides, and put on a coat of black paint which made it look like a new one. I returned it to her and she was much surprised to find that it was her old watering-pot which she did not recognize at first.

On Wednesday afternoon, October 29, the Sheet-Metal Class of the Lyceum Hall Prevocational Center visited Walker and Pratt's on Union Street.

We saw some men making furnace pipes and furnace tops in cone and flat shapes. Others were making ash-pans to slide into the bottom of stoves to catch the dropping ashes. There was one man who put aside all his work to show us how they did soldering. Mr. De Lappe, who is the head foreman, showed us all these things and many other things.

The work these men do is a great deal harder and heavier than what we do in the shop. We have all the machines they have except the corrugating machine.

On Friday afternoon all the prevocational classes of Boston gathered at the English High School on Montgomery Street. We saw pictures about the history of a book, both old and modern, and heard a lecture by Mr. England, the shop instructor of the bookbinding center at the U. S. Grant School. We also saw pictures of the Carborundum Company of Niagara, New York, and we heard a talk by one of their salesmen.

Our teacher thought that it would be a good idea if we could choose our own foreman for the week and one boy thought of a way which is as follows: We would elect a committee of three (one of them chairman) and their duty is to select a foreman each week and if he does not do his duty to discharge him. We have had three foremen already and they are doing their duty as well as it can be done.

We are making 800 angle irons for the wooden boxes that the boys in Lyceum Hall are making for the supply team.

In the school on Wednesday the bells were ringing feebly. Our section went in the shop on Wednesday afternoon. While we were in there our shop teacher, Mr. Moriarty, took two boys and told them to go down into the cellar and bring up the seven batteries.

The boys went down into the cellar and took them up to the shop. Then the boys took all the carbons out of the batteries. Our shop teacher called us over and said, "That's the way that crystals form on the carbons." The boys took their knives and scraped the crystals off and put new salammoniac in the jars and new water. Then the boys tested them by putting a bell on and the bell rang. Then the boys took them down into the cellar, and put them where they got them.

The causes of these crystals being on the carbons was because you ring the bells so many times that it wears out the zinc.

I have fifteen books of my own at home that I have bound. I started them at home and finished them up in school in spare time. Nearly every boy is binding books for himself. We did n't have any reading books, so we sent to New York for some books and we paid five cents apiece for them. We sent for "Jean Valjean," "The Lives of Daniel Webster and Henry Clay," and "The Gold Bug." It did n't cost us anything to bind these books, but if we bind larger books of our own it costs us about five cents each.

We were very glad this morning when we learned that Victor Baron had been given permission by Mr. Crawford to enter the Boston Industrial School next fall.

- We think he will make a success because he is a good worker.

We have just repaired for the nurse's room in our school the instrument used in taking the heights of the boys. It is composed of an upright about six feet long of one-inch brass tubing which is marked off in feet, inches, and eighths. This is supported by being set into tripod formed of brass tubing of the same size. The part we had to repair was the adjustable arm, which is made of aluminum with a hole in one end for the upright to pass through.

Our problem was to bore a new hole, as the old one had broken off. As we were without a one-inch drill and our cup punch would not cut it, we marked with our wing dividers a circle the correct size. Then with a hand drill we bored a number of small holes just as close as possible on the inside edge of the circle. This being done we cut out with a small chisel the metal that remained between the holes. Then with a half-round file finished the remaining part so that it would just fit over the tube.

After that we resoldered the old adjustment to the arm which gave us the problem of soldering brass to aluminum. For this we used Nokorode as a flux.

The damp weather taught us a good lesson, which is, not to scrape the solder so deep when finishing up articles made of tin, because they are sure to rust when you expose the iron.

Tin, you know, or what we call tin, is iron which is dipped into tin, which gives it a bright coating. The temptation to make our work look neat is very great, so we often scrape too closely; but the best way is simply to smooth the surface of the solder.

During the month of April we have made eight drip pans of zinc  $9\frac{1}{4}$  inches square for the Hyde Park High School. In return we are to receive 15 hammers and 15 mallet handles from their manual training department.

One of the graduates of our class of June, 1913, is now working as a bookbinder in F. J. Barnard & Co., Inc., on Federal Street. He was a good worker in school and a good worker in the shop.

The work we have done the first half of the year is: Rebound 300 books and 125 pamphlets, 750 Harvard covers, 2500 stenographers' notebooks, and 325 blocks of paper.

Mr. Brodhead, the head of the prevocational classes of Boston, is going to visit Germany. His intention is to learn the custom of the German schools. He will probably stay all summer, and we have printed cards in German with his name and Boston, Mass., U.S.A., and "Studiendirektor für Handfertigungsunterricht" on them. He is going to use the cards in Germany.

The boys of the Lewis School are beginning to form their baseball teams for the coming season. We will print the schedules.

We received a very fine letter from Mr. Morse, who is the Manual Arts Instructor in the West Roxbury High School, thanking us for the work we did for him on his staining table. This was very kind of him and we appreciate it very much.

We have lately read in the papers that the stores have taken account of stock, so we decided to do the same in the Eliot School. We wished to find out how many orders had been filled; also how much work we had on hand.

The following orders were shipped before March 1: 500 basket bottoms, assorted sizes from 4 in. by 6 in. to 11 in.; 78 straw-board photo-frames and 1000 splints for the special classes; 400 pieces shellacked news-board, 19 in. by 13 in., to the clay modeling department; 26 equipment trays and 72 threaded dowels with 72 wooden nuts tapped to match, to the lower grade normal training classes; 5 boxes with hinged covers and 48 square plinths, 4 in. by 1 in., to the drawing department; 100 topographic cloth-mounted maps of the United States to the Normal School; 12 drawer runners to the Quincy Prevocational Center; 1000 Harvard covers to the supply rooms; 29 trays to hold bench plans and 47 boxes to hold plane irons for our center.

We have the following orders to fill before school closes: 96 basket bottoms, 12 photo-frames, 4000 splints, and 150

alphabet boxes for the special classes; 3 modeling trays and 700 busy-work boxes for the lower grade manual training classes; 4 boxes with hinge covers, to hold type solids, and 5 sets of stained wood samples for the drawing department; 61 maple tool-racks for the manual training classes; 1 lantern slide carrying case for Mr. Emerson.

Mr. Smith, our master, has invited our boys over to the hall to tell the boys in the fifth, sixth, and seventh grades in the Mather School about the work in the Lyceum Hall Prevocational Center.

We boys like this school better than the regular schools and shall be glad to tell the boys all we know about the work.

We have so far made in the shop for the month of March the following articles: Ink fillers; garbage pails; waste cans; a sign which reads, "Lyceum Hall Prevocational Center"; measures ranging from a gill to a gallon.

We shall be pleased to fill any orders for any schools.

We have sharpened and repaired scissors, pliers, and shears for the Girls' Trade School, and in return they are making us some aprons for the shop.

The other day Mr. Dee, our shop instructor, took five of the boys from the eighth grade down to the Practical Arts High School (girls) to fix up a little printing-shop for them.

We fixed the press up and left it ready for use.

The same afternoon section C went to the Agassiz Museum in Cambridge with Miss Neely.

The boys did not know that any one building could have so many different objects of interest in it. We want to go there again sometime, and we would like to see the exhibition in the Peabody Museum the same day.



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